NETWORK WORLD

The Newsweekly of User Networking Strategies

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NET unveils T-3 mux in product blitz

By John Cox
Senior Editor

NEW YORK — Network Equipment Technologies, Inc. (NET) last week broadened its product line with the introduction of a high-end T-3 multiplexer and a low-end T-1 multiplexer that supports fractional T-1 services.

The products enable NET to meet customer demands in two areas: They provide more capacity to support emerging high-bandwidth applications such as local net interconnection, and they offer a cost-effective way to extend T-1 facilities to small remote sites, according to Bruce Smith, president and chief executive officer of the Redwood City, Calif.-based firm.

Besides introducing the Integrated Digital Network Exchange/90 (IDNX/90) T-3 multiplexer and the IDNX/10 T-1 multiplexer, the company announced new network management services, net management tools and a trio of local connectivity options for accessing IDNX backbones (see "NET adds tools for IDNX nets," page 62).

NET also announced a joint development agreement with Tellabs, Inc., a Lisle, Ill.-based manufacturer of communications equipment widely used

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PHOTO ©1989 SUSAN STEINKAMP

FCC Commissioner James Quello (left) confers with Chairman Dennis Patrick during a meeting on AT&T's Tariff 12 last week.

FCC ruling paves way for broader use of Tariff 12

Agency finds fault with current AT&T contracts but says carrier may offer custom net packages.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The FCC last week cleared the way for AT&T to continue offering Tariff 12 custom networks, although it also ruled that some provisions of the carrier's current Tariff 12 agreements are unlawful and must be revised.

After a two-year investigation of five existing Tariff 12 contracts, the Federal Communications Commission said AT&T may offer special prices on custom network packages as long as other users with comparable needs are offered similar deals.

Technically, the FCC rejected AT&T's existing Tariff 12 arrangements because they contain provisions that make it difficult for other users to get similar deals. However, AT&T may provide service to its existing commercial Tariff 12 users while it revises the tariffs in accordance with new FCC guidelines. Those current users are General Electric Co., Ford Motor Co., E.I. du Pont de Nemours & Co., American Airlines, Inc. and American Express Co.

Parties on both sides of the issue hailed the decision as at least

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AT&T plan discounts digital service fees

New multiservice discount program offers up to 40% savings for users of T-1, T-3 and DDS.

By Bob Wallace
Senior Editor

BASKING RIDGE, N.J. — AT&T last week announced a new multiservice volume-pricing plan that offers users discounts of up to 40% in return for long-term commitments to its digital transmission services.

The plan covers the interoffice segment of AT&T's Dataphone Digital Service, Accunet T1.5 Service and Accunet T45 (T-3) Service. It provides discounts ranging from 6% to 40% to users that commit to one of six volume levels for a one- to five-year period. The price cuts are slated to go into effect May 26.

AT&T customers responded favorably to the announcement. "We already have a five-year volume-pricing arrangement for T-1 service, but I'm sure we'll move to the new plan because it provides discounts for DDS usage as well," said Robert Heinze, manager of transmission systems for McDonnell Douglas Aerospace Information Services Co. His company provides communications services for McDonnell Douglas Corp.'s subsidiaries.

Under the new volume-pricing plan, AT&T set monthly revenue commitment levels at $25,000, $50,000, $100,000, $200,000, $500,000 and $1 million, with contract lengths of one to five years — the same levels used in its T-1 volume-pricing plan.

The revenue commitment lev-

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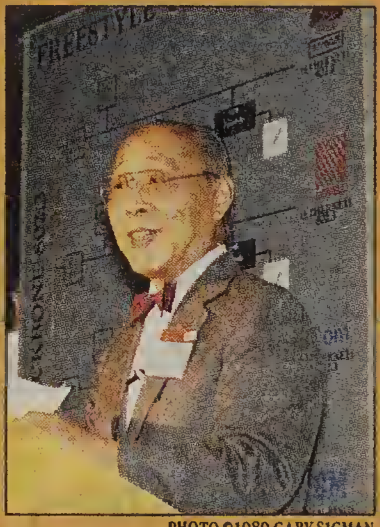

PHOTO ©1989 GARY SIGMAN

An Wang holds summit with LAN leaders, page 4.

LAN Mgr. gets mixed user grades

By Susan Breidenbach
West Coast Bureau Chief

SAN FRANCISCO — The first six months of OS/2 LAN Manager sales don't amount to much, but Microsoft Corp. and 3Com Corp. say they are satisfied with the rollout of the network operating system they developed.

"We're pretty happy with the way things have gone so far," said Steve Kanzler, Microsoft's product marketing manager for LAN Manager. Alan Kessler, marketing director for 3Com's Software Products Group, concurred, saying, "You don't conquer the world overnight."

The world of local networking is currently ruled by Novell, Inc.'s NetWare, but Microsoft and 3Com are trying to convince users that LAN Manager is heir apparent. 3Com released the first commer-

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NETLINE

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AN ARIZONA HOSPITAL embraces an open network protocol for the health care industry. Page 2.

HP BUYS UP APOLLO in a bid for dominance in the workstation market. Page 2.

NACHA BLENDS EDI, EFT in white paper on transmission of payments and remittance data. Page 4.

DEC OFFERS A FIBER option for network users through a deal with ChipCom. Page 4.

AT&T MAKES EDI NEWS at a major electronic data interchange confab. Page 6.

THE GROWING USE of T-carriers and digital data services has spawned a thriving market for DDS and T-carrier test equipment. Page 35.

NEWSPAPER

FEATURE

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NASA to launch new era with switching satellite

By Kris Herbst
Special to Network World

The first communications satellite — a simple reflective sphere called Echo 1 — was launched into a shallow orbit in 1960. Since then, communications satellites have evolved rapidly into today's sophisticated geosynchronous transponders.

Now, the National Aeronautics and Space Administration is on the verge of introducing the next-generation communications satellite to the world. NASA's Advanced Communications Technology Satellite (ACTS) will be a "switch in the sky" capable of simultaneous distribution of multiple T-1 circuits to 2.4-meter-diameter Ka-band earth stations.

"This kind of technology, where you can have that big switchboard in the sky, is a very exciting concept," says Rep. Bill Nelson (D-Fla.). Nelson, a former space shuttle astronaut, is chairman of the House Space, Science and Applications Subcommittee.

In addition to functioning as

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Hospital utilizes HL-7 in multivendor net project

Emerging open net protocol will provide access to data, applications on a variety of systems.

By Wayne Eckerson
Staff Writer

SCOTTSDALE, Ariz. — Scottsdale Memorial Health Systems, Inc. has decided to scrap its centralized hospital information system in favor of a network linking multivendor systems with a protocol being developed by the health care industry.

The nonprofit health care firm plans to install at two hospitals here local networks to link departmental minicomputers, personal computers and other local networks. The networks will be linked using a T-1 or 56K bit/sec line and the combined system will support the Health Language-7 (HL-7) protocol.

Use of HL-7 will enable doctors and nurses to access applications and patient information — such as results of blood tests, radiology reports and registration data — from any system on the network, according to Jerry Walker, senior vice-president of finance at the firm.

Stipulating vendor conformance to HL-7 will ensure compatibility between departmental systems and give departments the flexibility to select computers best suited for their needs, instead of forcing them to use a shared system, Walker said.

HL-7 defines the application layer of the Open Systems Interconnection model for the health care industry. It borrows elements from several proprietary and standards-based protocols already used in health care applications and runs on top of lower level standards such as Ethernet and Transmission Control Protocol/Internet Protocol.

Draft specifications for HL-7 were released in September by an HL-7 standards committee formed two years ago and composed of health care representatives from hospitals and vendor organizations.

"An open network architecture based on HL-7 will give doctors, nurses and administrators ready access to patient information they need to do their jobs more efficiently and effectively. The end result is a higher quality of patient care," Walker said.

Scottsdale Memorial's network, which Walker expects will be implemented within a year at a cost of about $450,000, will eventually integrate about 20 departmental processors.

The firm will use Simborg Systems Corp.'s STAT LAN software

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HP bolsters workstation line with buyout of Apollo

Gains control of Network Computing System.

By Sarah Vandershaf
West Coast Correspondent

PALO ALTO, Calif. — Hewlett-Packard Co. last week said it plans to buy Apollo Computer, Inc., the company that pioneered the engineering workstation, for $476.4 million.

The move will make HP one of the two largest workstation manufacturers in the world and give it control over Apollo's Network Computing System (NCS), an architecture for distributed computing that Apollo uses and licenses to other vendors.

"We think the product and technical capabilities of Apollo are very complementary with HP," said Mark Tolliver, marketing manager for HP's Workstation Group. "We see NCS as an innovative extension of their leadership in workstation networking. We thought enough of it to license parts of it early on."

A long-term drop in the value of Apollo's stock caused by its eroding market share prompted HP's offer, said Peter Rogers, an analyst with Robertson Stevens & Co. in San Francisco.

"Apollo has been in trouble for a couple of years," Rogers said. "What Apollo gets out of this deal is that it gets saved from itself. The company finally faced up to a future that was obscurity."

The real surprise is that no one bought Apollo sooner, according to Rogers.

"For over a year and a half, they've been saying that any qualified bid would be entertained," Rogers said. "They were the No. 1 buyout candidate on every computer analyst's list for all of 1988."

The superior quality of Apollo's products, including NCS, was one of HP's reasons for making the offer, Rogers said.

"We hope people will think that Apollo has found a good home and that good ideas like NCS will have a place to grow up," Tolliver said.

NCS makes it possible to break apart applications and implement the pieces on different computers in a network. Benefits for users include faster processing, because multiple CPUs can work

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Briefs

AT&T discounts ETN service. As expected, AT&T last week announced Service Node Controller (SNC), a new service that will save Electronic Tandem Network (ETN) users up to 40% on the cost of local access trunks. The service is slated to become available on May 27.

SNC will enable private branch exchanges with Integrated Services Digital Network Primary Rate Interface support to off-load some ETN routing chores to AT&T's network, thereby reducing the number of local access trunks needed to support intermediate ETN nodes ("New AT&T service promises big savings," *NW*, March 13).

The first SNC offering, SNC-1, offers up to 580 voice-grade circuits for $50 per month. SNC-2 provides a maximum of 2,700 voice-grade circuits for $500 a month.

FCC to examine AT&T market role. The Federal Communications Commission last week directed staff members to reopen an investigation into whether AT&T holds a dominant position in the long-distance market.

FCC Commissioner Patricia Diaz Dennis said a ruling on AT&T's market status is vital if the FCC is to reach appropriate decisions on issues such as Tariff 12 and Tariff 15.

The agency's apparent reluctance to face these issues "gives the appearance . . . of an attempt to achieve preconceived results through the path of least resistance — the back door," she said.

It is doubtful that the FCC would rule AT&T is a nondominant carrier because FCC Chairman Dennis Patrick said earlier this year that applying price caps to AT&T presupposes the carrier is dominant.

System 85 users get Definity pitch. Roughly 450 AT&T private branch exchange users last week gathered at the System 85 Users Group meeting, where AT&T schooled attendees on migration to its new Definity PBXs.

"There was a great deal of interest in AT&T's [technical] presentations. A number of users hadn't been briefed and came to learn more," said Edward Fontenot, president of the System 85 Users Group.

Users complained to AT&T about the process it uses to inform customers of any software and hardware upgrades made to the System 85 switch — a process Fontenot says needs improvement.

AT&T is developing a new program under which its technicians meet with System 85 customers to inform them of planned changes, explain the reasons for them and schedule an appointment to make the necessary changes, Fontenot said.

Telecom costs inch up. In the first quarter of 1989, the average cost of business telecommunications rose for the first time since the AT&T breakup, according to research by CCMI/McGraw-Hill, a division of McGraw-Hill Information Services Co.

CCMI/McGraw-Hill publishes the Telecommunications Price Index, which is based on the weighted average of telecommunications rates. In the first quarter, the index inched up 2%, said George David, president of CCMI/McGraw-Hill.

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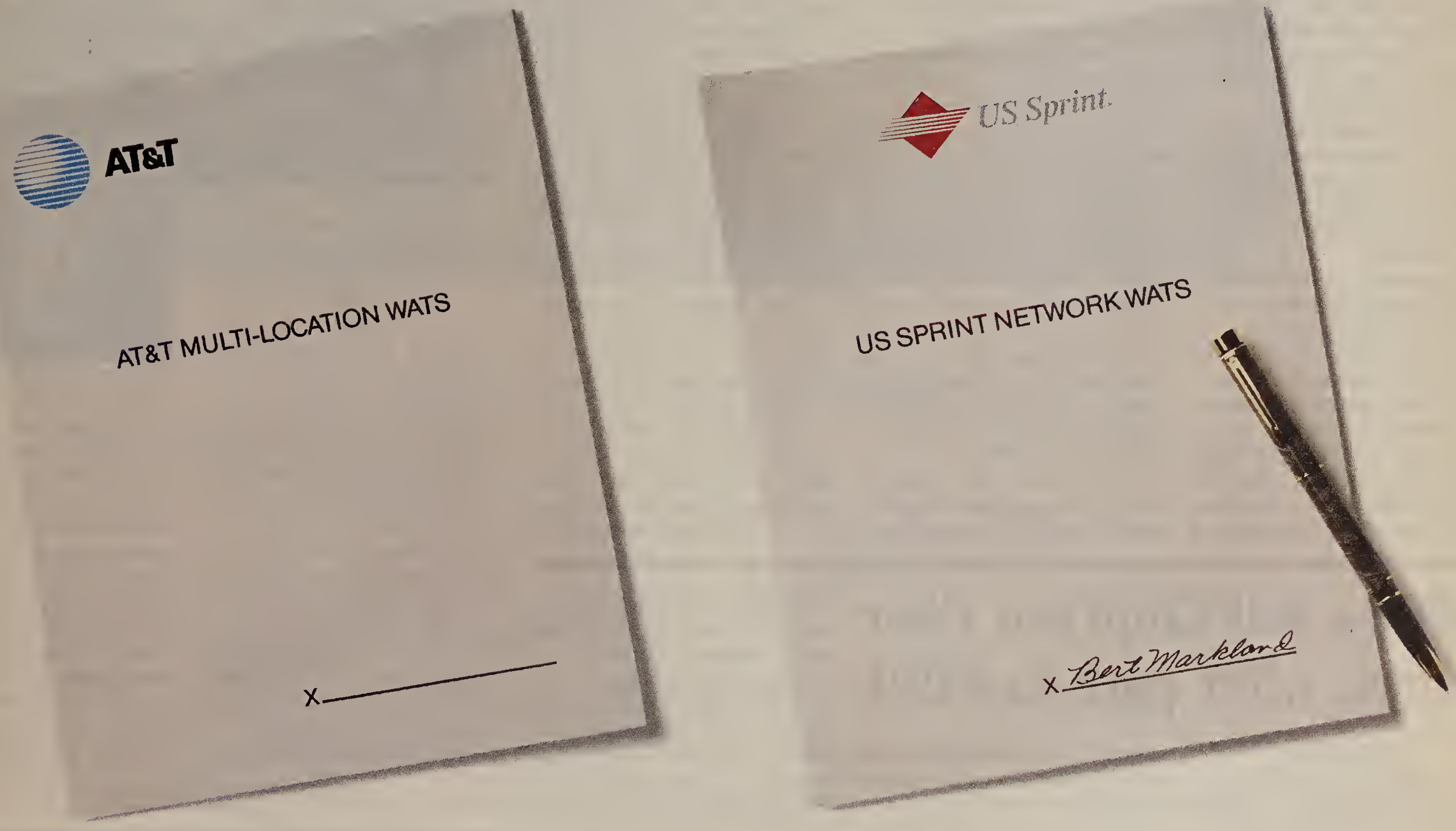

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NACHA report supports merger of EFT and EDI

Combination cuts costs, improves cash flow.

By Barton Crockett
Senior Editor

HERNDON, Va. — The National Automated Clearinghouse Association (NACHA) has published a position paper concluding that the best way for companies to pay their suppliers is to simultaneously transmit funds and payment information over bank-run networks.

NACHA, based here, is advocating a fundamental change in the way corporations handle payments and a new role for the country's electronic funds transfer networks.

Historically, these networks have handled only funds transfers. The networks were, for the most part, unable to accept remittance data, which is the documentation that explains the payment.

However, in recent years this has begun to change, as banks have increasingly embraced electronic funds transfer standards that allow for the transmission of remittance information. This merger of electronic funds transfer and electronic data interchange technology cuts data-entry costs and improves cash management, according to NACHA's "EDI Position Paper."

Several users agreed.

"This is important from a control standpoint," said Stephen McDonough, senior financial representative for Houston-based Shell Oil Co. "It simplifies things for us if we have only one transmission."

McDonough said Shell will begin pilot-testing a program to send remittances electronically with payments later this month. Shell is joining the growing ranks of organizations that are doing this. The U.S. government plans to send out some 77 million electronic payments with remittance information in 1991.

In all, about 200 organizations in this country are pilot-testing programs to send remittance information with electronic payments, according to William Nelson, senior director of net services at NACHA and author of the position paper.

Major investments

Modifying electronic funds transfer nets to handle remittance information will require major investments on the part of banks, the "EDI Position Paper" said (see "Federal Reserve preps for future, plans EFT net overhaul," page 59).

A bank must be able to receive remittance data from a corporation and forward that information to the receiving party's bank over one of the nation's 42 automated clearinghouse networks. The receiving bank must then be able to forward the information to the supplier.

However, according to the report, only 200 to 300 of the 17,500 depository institutions using NACHA-governed payment networks are currently able to forward remittance information to their customers.

"To satisy the needs of corporations that will want 100% of their EDI payments and remittance data to be handled elec-

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LAN execs back Wang

(Left to right) William Krause, 3Com; David Mahoney, Banyan; An Wang; Ray Noorda, Novell; and John McElroy, IBM.

Top executives from four local net companies gathered with An Wang, chairman and chief executive officer of Wang Laboratories, Inc., at last week's Comdex/Spring '89 in Chicago to show their support for Wang's Freestyle multimedia communications system.

Using the Freestyle-LAN Office Interface, Freestyle systems can communicate over local nets running Novell, Inc.'s NetWare, 3Com Corp.'s 3+Share and 3+Open, Banyan Systems, Inc.'s VINES and IBM's PC LAN Program operating systems. Freestyle LAN Office Interface, which was unveiled last month, works in conjunction with the LAN Office system.

The Freestyle system, introduced last November at Comdex/Fall '88, runs on Wang's PC 200/300 Series or any IBM Personal Computer AT-compatible microcomputer. It consists of hardware and software that lets microcomputer users annotate screen-displayed text and data files with voice messages and handwritten notes. The Freestyle-LAN Office Interface software costs $100 and is expected to ship in the third quarter.

PHOTOGRAPHY © 1989 GARY SIGMAN/BLACK STAR

DEC to sell ChipCom fiber wares, offer path to FDDI

By Jim Brown
New Products Editor

LITTLETON, Mass. — Digital Equipment Corp. last week announced an agreement to resell ChipCom Corp.'s fiber-optic local network products, making good on an earlier pledge to offer DECnet over a variety of network media, including fiber.

DEC said the ChipCom fiber network products will give users an upgrade path to the high-speed Fiber Distributed Data Interface (FDDI) networking standard. FDDI specifies use of fiber to support a 100M bit/sec token-passing network that can link attached processors and other networks.

DEC currently supports DECnet over shielded and unshielded twisted-pair wiring, as well as baseband and broadband coaxial cable, said Gail Daniels, director of work group and local network marketing for DEC's networks and communications group.

ORnet line

Under the agreement, DEC will resell ChipCom's ORnet products to its customers worldwide. The ORnet products include stand-alone transceivers, multimode fiber-optic cable and either eight- or 14-port active star couplers.

ChipCom, based in Waltham, Mass., introduced the ORnet products last May ("ChipCom's ORnet fiber LAN debuts," *NW,* May 9, 1988).

Users attach devices such as personal computers or engineering workstations to an ORnet transceiver, which is linked via fiber to a port on an active star coupler. Multiple active star couplers can be linked together via fiber in an Ethernet network supporting as many as 1,024 devices.

Daniels said ORnet gives DEC customers the ability to expand existing corporatewide Ethernets using fiber. A fiber-based Ethernet can be linked to existing coaxial- or twisted pair-based Ethernets running DECnet via a DEC LAN Bridge 100.

In the future, DEC and ChipCom said ORnet active star couplers could be retrofitted to support a link to a backbone FDDI network.

This fits with DEC's strategy to offer FDDI as a backbone network or as a local network capable of connecting computers, the company said. In an FDDI backbone network, users could link desktop devices and minicomputers to an Ethernet running DECnet. They would then connect the Ethernet to a backbone FDDI network. Or, in a local network situation, FDDI would be used to directly connect processors in a token-passing network.

ORnet supports 62.5-micron or 125-micron multimode fiber cable, which the ANSI X3T9.5 committee prefers for use in FDDI networks. With ORnet, DEC can build add-on products that enable customers to use the fiber installed for ORnet to support FDDI, said Greg Cline, a senior analyst with The Yankee Group in Boston.

Both DEC and ChipCom said FDDI will not replace ORnet, however. "Both companies see Ethernet and FDDI coexisting over many years. They have different roles for different purposes and will work very nicely hand in hand," said Rob Held, ChipCom president.

DEC has been pushing DECnet networks for factory automation applications. However, Daniels said last week's agreement is not an attempt to match the efforts to use fiber-optic cable in Manufacturing Automation Protocol nets.

"This is not a plot on DEC's part to dominate the factory floor with fiber," Daniels said.

Analysts agreed. "Fiber doesn't seem to be terribly popular in the factory," said Brian Jeffery, managing director of Information Technology Group, a consulting firm in Los Altos, Calif. "I think you're probably looking at just a niche addition to [DEC's] product line here."

Both DEC and ChipCom will sell ORnet transceivers for $595. The eight-port active star coupler is priced at $4,150, while the 14-port active star coupler costs $5,950.

Correction: The story "FCC ruling to open 800 service options" (*NW,* April 3) incorrectly listed the owner of the 1-800-CAR-RENT telephone number. It is the reservation number for National Car Rental System, Inc.

AT&T plan cuts digital fees

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el is based on total monthly interoffice billing for all the digital services, not the amount of billing for each service.

For example, a user that subscribes at the $25,000 monthly revenue commitment level for one year and has $28,000 in total billing for interoffice channel services in the month would have the minimum 6% discount applied to each service. The user would save $1,680.

A user that commits to the $1 million monthly level for five years and has $1 million in total billing per month for interoffice channel services would enjoy the maximum 40% discount, saving $400,000.

Some restrictions

The plan does not cover interoffice channels purchased under an individual service's volume-pricing plan or fixed-rate plan, or access and central office service functions such as M24 multiplexing.

A user that already has a volume-pricing plan for T-1 service and wants to sign up for the multiservice plan must sign a longer term deal or commit to a larger revenue level for the new pact, according to an AT&T spokeswoman. A user cannot, for example, leave a three-year volume pricing plan for a two-year multiservice arrangement.

Competitive tool

Despite the huge discounts available with the plan, AT&T's T-1 prices are still up to 40% higher than US Sprint Communications Co.'s T-1 rates, analysts said.

"US Sprint has the lowest T-1 rates of the three [top] carriers. It may be another year before AT&T can bring its T-1 prices in line with those of its competitors," said Page Montgomery, vice-president of Economics and Technology, Inc., a Boston-based tariff analysis and network design firm.

But the multiservice plan will make it more difficult for rivals to win customers from AT&T, according to analysts.

"AT&T is using the multiservice volume pricing plan to encourage users to buy all their [digital] services from one place," said Robert Self, president of Market Dynamics, Inc., a tariff analysis and network design firm in New York. "Users will be less likely to experiment with other carriers."

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Sun, Apollo, Prime detail results of joint FDDI compatibility tests

By Laura DiDio
Senior Editor

SUNNYVALE, Calif. — Sun Microsystems, Inc., Apollo Computer, Inc. and Prime Computer, Inc. last week announced the successful completion of a test showing that their respective 100M bit/sec FDDI local network products are compatible.

The ability to demonstrate compatibility among multivendor Fiber Distributed Data Interface products could mean users will see reliable FDDI products as early as this fall, vendors and analysts said.

The vendors teamed up to make the announcement after running their FDDI interface controllers through seven days of basic interoperability tests at Advanced Micro Devices, Inc.'s (AMD) laboratory here. AMD makes FDDI microchips.

The eight-node test network included two workstations from each company outfitted with their respective three-board FDDI controllers based on AMD's FDDI Supernet chipset. AMD participated in the test using two prototype FDDI interface controllers developed exclusively for test purposes. Fiber linked the workstations.

Although the FDDI standard is still being defined, most of the basic components are set, which made the test feasible.

Besides proving that different workstations could successfully pass data across an FDDI net, the tests showed workstations could support the data transfer, physical net management, fault isolation and net recovery capabilities specified in the standard, said Larry Garlick, vice-president of distributed systems at Sun.

"The success of the demo shows that FDDI products are a lot closer to reality than most people realize," said Mark Freund, senior vice-president of Interconnect Network Consulting Group in Pasadena, Calif.

"Users can anticipate that FDDI products will start to hit the streets later this year," said Doug Hunt, manager of FDDI development at Prime.

All three computer vendors plan to bundle the FDDI controllers into their workstations and will unbundle them only for current customers that want to upgrade to FDDI. Pricing on the forthcoming FDDI products has not yet been set. The FDDI interfaces currently available cost from $15,000 to $30,000 per node, meaning few users can afford the technology except in certain backbone applications ("FDDI prices force users to backbones," *NW,* April 3).

Analysts gave the vendors high marks for testing the interoperability of their FDDI products before shipping, saying it is one of the few times product testing has been done *before* a local network technology standard has been finalized.

The FDDI standard is being finalized by the X3T9.5 Accredited Standards Committee and is about 75% complete. Most of the work still to be done revolves around the Station Management Task (SMT) software portion of the standard, which defines FDDI net management.

"This tells users that it's safe to buy FDDI products as soon as they're available, and they can be reasonably certain that if they install heterogeneous workstations on their FDDI nets, they'll be able to communicate," said Mike Howard, vice-president at Infonetics, Inc., a consulting firm in Santa Clara, Calif.

Howard noted, however, that the vendors did not perform interoperability tests for all portions of the FDDI standard. "It's not all there yet. The interoperability operations they performed are basic pieces of the standard," he said. For instance, Howard said, the vendors only tested built-in fault tolerance on a single FDDI ring, while the standard specifies dual counter-rotating rings of 100M bit/sec each.

Additionally, Howard said, "The workstations were all located within several feet of one another in the AMD lab; they haven't yet proven that their systems can be located up to 1.2 miles apart — the maximum distance specified in the standard — and still communicate." ☒

AT&T unveils ambitious EDI service plans

By Bob Brown
Senior Writer

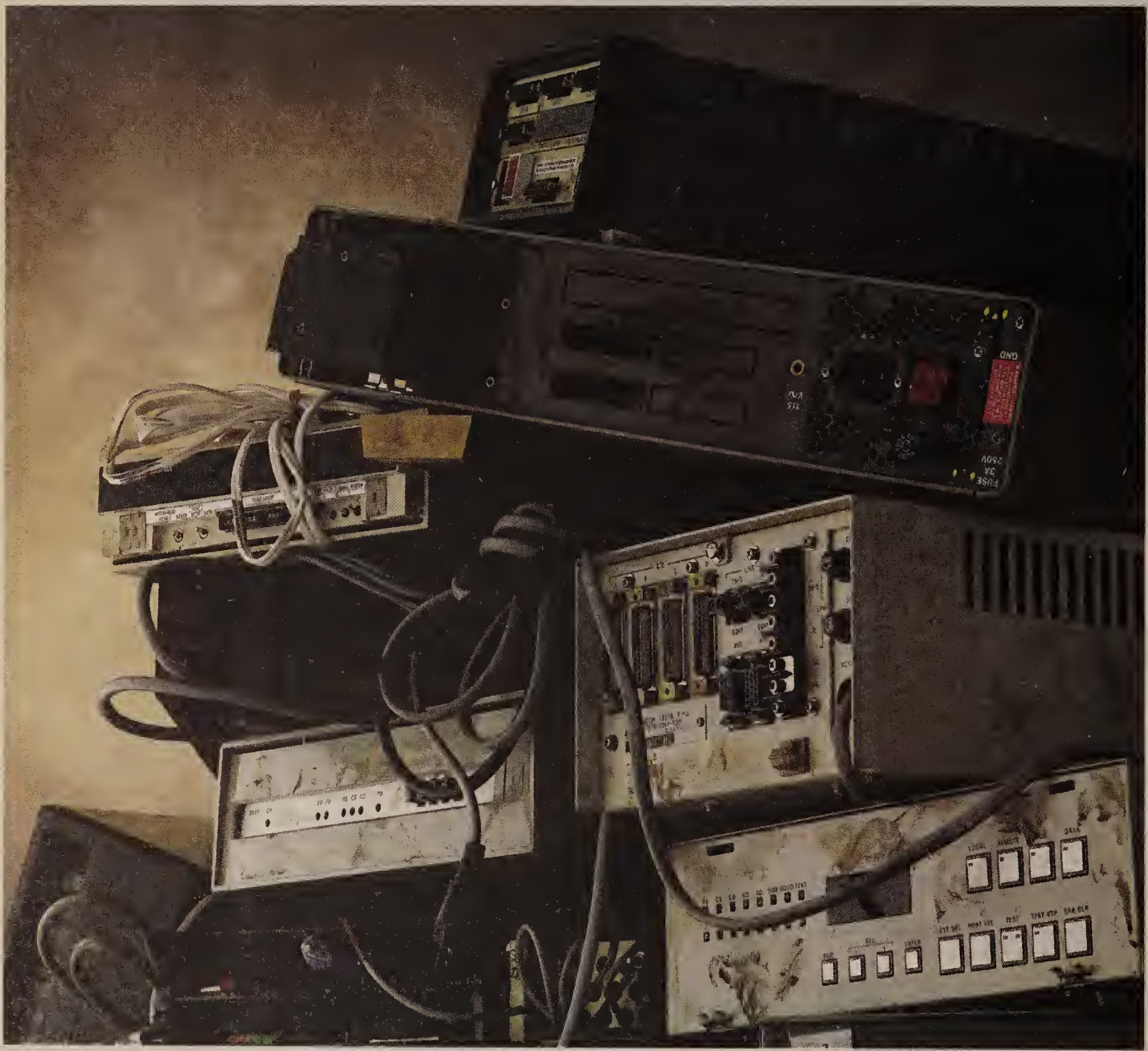
NEW ORLEANS — AT&T last week fleshed out its electronic data interchange service with the announcement here of a number of agreements with other EDI vendors. In addition, the company detailed its internal use of the technology.

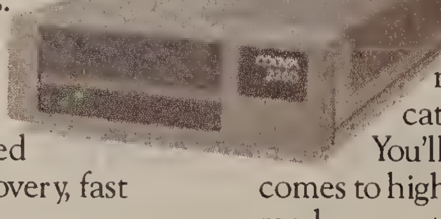
Discussing its EDI strategies at the ANSI Accredited Standards Committee X12 EDI Conference here, AT&T said the announcements bolster its efforts to play a significant role in the EDI market. "We plan to be a leader in EDI," said Gary Dalton, AT&T's EDI Business Manager. "These agreements will help us get there."

Agreements concerning AT&T EDI service, which was announced last October ("AT&T reveals plans to offer EDI service," *NW,* July 18, 1988), included:

- A deal with Martin Marietta Data Systems to resell AT&T Mail, an electronic mail service, and AT&T EDI service. The agreement lets Martin Marietta resell

(continued on page 13)





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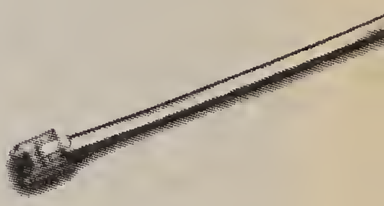

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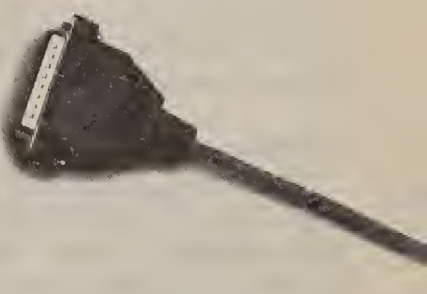

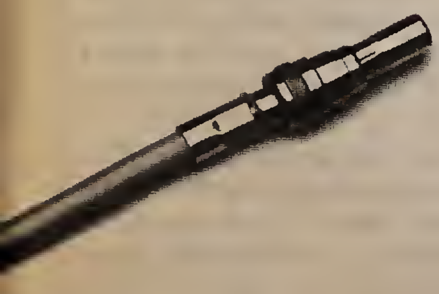

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AT&T to reveal plans for transpacific fiber cable

MCI, US Sprint partners in TPC-4 cable project.

By Gail Runnoe
Washington Correspondent

WASHINGTON, D.C. — AT&T, along with a group of partners that includes its major rivals, is expected to announce plans this week to build a $795 million transpacific fiber cable that will be the first direct link between the U.S. mainland and Japan.

AT&T and seven other partners, including MCI International, Inc. and US Sprint Communications Co., last month sought Federal Communications Commission approval to construct the Trans-Pacific Cable-4 (TPC-4). If the FCC approves the project, TPC-4 could be operational as early as October 1992.

AT&T, MCI International and US Sprint also share ownership in the transatlantic TAT-9 fiber link.

The TPC-4 system will connect sites in Point Arena, Calif., and Port Alberni, British Columbia, to Chikura, Japan.

According to AT&T, TPC-4 will provide 75,600 virtual voice paths or 15,120 channels — double the capacity of AT&T's HAW-4/TPC-3 fiber cable, which runs from San Francisco to Boso, Japan, via Oahu, Hawaii, with a connection to the island of Guam. That cable is expected to become operational later this year.

In addition to carrying its own traffic, TPC-4 would also serve as a backup to HAW-4/TPC-3.

Partners in the TPC-4 project said the new cable will increase the number and diversity of transpacific transmission options. Currently, approximately 80% of AT&T's transpacific traffic is carried via satellite.

TPC-4 will employ new 1.55-micron fiber technology that will lower the system costs by 35% compared with HAW-4/TPC-3. AT&T said the estimated original capital cost of a 64K bit/sec half-channel in HAW-4/TPC-3 was $40,000. The same half-channel in TPC-4 will cost $12,200.

AT&T, MCI and US Sprint have 35%, 8.4% and 1.6% interests in the project, respectively. The other partners are Fedex International Transmission Corp., a wholly owned subsidiary of Federal Express Corp.; FTC Communications, Inc.; Overseas Telecommunications, Inc.; TRT Telecommunications Corp.; and Western Union World Communications, Inc. ☐

FCC paves way for Tariff 12

continued from page 1

a partial victory and debated what the ruling means for another strategic AT&T service arrangement — Tariff 12 (see "Tariff 15's fate unclear in wake of FCC ruling," this page).

MCI Communications Corp. and US Sprint Communications Co. said they were pleased that the tariffs were rejected, while AT&T applauded the FCC's decision to allow the company to continue offering Tariff 12 deals.

Users, including Tariff 12 customers, also said they were happy with the decision.

James Blaszak, counsel for the Ad Hoc Telecommunications Users Committee, to which a number of current Tariff 12 users belong, said the group supported the FCC's decision. "It's clear that Tariff 12 is desired by customers. It's also clear customers believe Tariff 12 is not functionally equivalent to any other service, and it ought to be available," he said.

FCC Chairman Dennis Patrick agreed. "We had a unanimous record of support among customers who [discussed] . . . the importance of AT&T offering these service options," he said.

Patrick said it is clear that Tariff 12 services differ from the component services used in Tariff 12 networks in both functionality and contract terms.

The legal tangle

The main legal argument over Tariff 12 centered on whether the deals constituted unique service offerings and whether the services could be priced on a customer-specific basis.

The FCC ruled that AT&T's Tariff 12 packages are different from the component services sold separately and, therefore, AT&T is not engaging in discrimination by charging different prices to Tariff 12 and non-Tariff 12 customers. But the commission rejected current Tariff 12 offerings because they contain language restricting services and special prices to specific local access and transport areas — provisions the FCC said would prevent similar customers in other LATAs from obtaining the same deal. The agency also said that other provisions in the offerings might be viewed as restrictive.

Opponents claimed the Tariff 12 services are not unique but simply packages of existing offerings that are provided at higher rates through individual tariffs.

PHOTOGRAPHY©1989 SUSAN STEINKAMP

The FCC's Dennis Patrick

Supporters said Tariff 12 allows AT&T to design unique network arrangements to meet the special needs of large customers. AT&T argued that discounts were made possible because of network efficiencies resulting from bundling services.

One Washington, D.C. attorney, who asked not to be named, said the revisions will amount to only minor changes. "Based on the description we heard, all AT&T has to do is get out an eraser and delete the portions of Tariff 12 that specify LATAs," he said.

With the vote last week, AT&T, attorneys, users and the FCC declared the decision a victory for large users. They said Tariff 12 offers users an option they cannot get otherwise. AT&T issued a statement characterizing the decision as "another step forward for customers."

Gerald Brock, chief of the FCC's Common Carrier Bureau, said Tariff 12 services are unique. "We concluded that customers do perceive . . . Tariff 12 as a different kind of offering than what they can get by simply putting together parts on their own."

Although AT&T must revise its current Tariff 12 deals, representatives from American Airlines, GE and American Express said their companies were pleased with the decision.

One prospective Tariff 12 user, Tom O'Toole, manager of telecommunications systems at Westinghouse Electric Corp., said he was encouraged by the FCC decision and is unconcerned about future legal snags. "If anything, the FCC's decision will make us even more confident that we can enter into that kind of agreement," O'Toole said.

Critics of Tariff 12, including FCC Commissioner Patricia Diaz Dennis, said the issue is far from dead and will likely be appealed in court. Diaz Dennis voted to reject Tariff 12 and said she strongly opposes allowing AT&T to refile the tariff after revisions.

In a statement last week, Diaz Dennis said she believes the FCC ignored its own rules on discriminatory discounts, availability of service to all customers and the ability of resellers to purchase the service.

"What we've done is put off for another day issues that will have to be relitigated," Diaz Dennis said. "Ignoring our rules, rather than explaining why they might no longer serve the public interest, simply increases the likelihood that we will not pass judicial muster if this issue is ultimately reviewed." ☐

Users weigh role of global standards in EDI strategies

By Bob Brown
Senior Writer

NEW ORLEANS — Users at a major electronic data interchange conference here last week said they will eventually use emerging international EDI standards but have no plans to implement them for at least the next few years.

Most users interviewed by *Network World* at the ANSI Accredited Standards Committee X12 EDI Conference said they will work first to implement the ANSI X12 standards for document exchange with domestic and some international trading partners.

Once they become more proficient using X12 EDI standards, users said they plan to draft strategies for implementing the emerging international EDI for Administration, Commerce and Transport (EDIFACT) standards, which will be further developed by then.

Similarly, members at the second meeting of the EDI Council of the USA (EDICUSA) said they are taking a wait-and-see attitude toward EDIFACT, according to a spokeswoman for the Transportation Data Coordinating Committee: The Electronic Data Interchange Association (TDCC/EDIA). This committee sponsored the EDICUSA meeting, which preceded the ANSI conference here. "They want to get their initial EDI implementations under their belts first," the TDCC/EDIA spokeswoman said.

EDIFACT is a family of standards being developed by a United Nations-sponsored group. EDI users on both sides of the Atlantic Ocean are pushing for a migration to EDIFACT standards, which allow for more flexibility than the ANSI X12 standards. The ANSI standards do not take different currencies and measurements into account.

Currently, however, only one EDIFACT standard — for commercial invoices — exists. At least five more EDIFACT standards are expected to be approved in September.

Some users said they do not see a need to use EDIFACT until their foreign trading partners demand EDIFACT support.

Pat McAbee, manager of EDI for Milliken & Co. in Spartanburg, S.C., said most of his firm's trading partners are based in either the U.S. or Canada, making implementation of the international EDI standards a low priority.

"We'll probably use EDIFACT, but not until we really need to," McAbee said. "None of our European trading partners have pressured us to use it so far."

Larry Morpurgo, manager for

(continued on page 60)

Tariff 15's fate unclear in wake of FCC ruling

WASHINGTON, D.C. — In the wake of the FCC's ruling on Tariff 12 last week, supporters and opponents of AT&T's Tariff 15 debated what the decision means for that custom network arrangement.

Tariff 15 allows AT&T to offer network services at off-tariff prices in response to a competitor's offer. AT&T's offering for its first and only Tariff 15 customer, Holiday Corp., is currently under investigation by the Federal Communications Commission.

Dan Kelley, director of regulatory policy at MCI Communications Corp., a vocal opponent of three AT&T customer-specific tariffs, said the FCC's Tariff 12 ruling will deal a blow to Tariff 15.

"If [Tariff 12 deals] were rejected because they were limited to specific LATAs, then Tariff 15 has to be rejected or found unlawful because it's limited to a specific customer," he said.

John Hoffman, vice-president for external affairs at US Sprint Communications Co., another opponent of Tariff 15, said he believes the Tariff 12 ruling is a signal that Tariff 15 will be rejected.

"The message is pretty clear. What the FCC is saying is, 'We don't like customer-specific pricing,' " Hoffman said. "I think this is a very clear signal that Tariff 15 is dead."

Gerald Brock, chief of the FCC's Common Carrier Bureau, said the decision on Tariff 12 could have implications for other tariffs. "The reasoning used in this order will obviously influence our reasoning in other cases that raise similar issues," Brock said.

Lawrence Garfinkel, AT&T vice-president of Marketing Services, downplayed the impact that the Tariff 12 ruling might have on the other tariffs. "I don't read anything in Tariff 12 that transfers to Tariff 15," he said. Tariff 15 deals are direct responses to competition from other carriers, whereas Tariff 12 offers users custom network services, he said.

— Anita Taff

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TITLE ....

COMPANY NAME ....

DIVISION/DEPARTMENT ....

STREET ADDRESS ....

CITY .... STATE .... ZIP ....

C. Please Answer ALL Questions, Sign & Date the Form.

1. Industry: (check one only)

01. ☐ Manufacturers (other than computer/communications)
02. ☐ Finance/Banking
03. ☐ Insurance
04. ☐ Real Estate
05. ☐ Healthcare Services
06. ☐ Legal
07. ☐ Hospitality
08. ☐ Retail/Wholesale Trade
09. ☐ Transportation
10. ☐ Utilities
11. ☐ Education
12. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
13. ☐ Government State/Local
14. ☐ Government Federal
15. ☐ Military
16. ☐ Aerospace
17. ☐ Consultants (independent)
18. ☐ Carriers
19. ☐ Interconnects
20. ☐ Manufacturers (Computer/Communications)
21. ☐ VAR/VAD/Systems House
22. ☐ Distributor, Computer Related
23. ☐ Distributor, Communications Related
24. ☐ Other ____________________

2. Job function (check one only)

1. ☐ Networking Management (Responsible for both voice & data)
2. ☐ Data Communications Management (Responsible for data only)
3. ☐ Telecommunications Management (Responsible for voice only)
4. ☐ MIS Management (VP,Dir,Department Head)
5. ☐ Corporate Management (Chairman, President, Owner, General Manager, CEO, CIO, VP)
6. ☐ Financial Management
7. ☐ Engineering Management
8. ☐ Consultant (Independent)
9. ☐ Other____________________

3. Your primary responsibility (check one only)

1. ☐ Data Networking
2. ☐ Voice Networking
3. ☐ Both
4. ☐ None

4. Is your network: (check all that apply)

LOCAL AREA NETWORKS
1. ☐ Local (within building)
2. ☐ Local (in a campus environment)

WIDE AREA NETWORKS
3. ☐ International
4. ☐ National
5. ☐ Regional (several states)
6. ☐ Metropolitan

5. Which transmission media do you use in your network: (check all that apply)

Public:
1. ☐ Switched-Based (DDD,Wats,Megacom,etc.)
2. ☐ Leased Line (not including T-1)
3. ☐ T-1
4. ☐ T-3
5. ☐ Digital Data Service

Private:
6. ☐ Satellite
7. ☐ Microwave
8. ☐ Fiber Optic

6. Which of the following vendors will you consider buying your PBX/ Central Office Switch from in the next 12 months? (check all that apply)

	A PBX	B COS	
01.	☐	☐	AT&T
02.	☐	☐	ALCATEL
03.	☐	☐	CONTEL
04.	☐	☐	ERICSSON
05.	☐	☐	FUJITSU
06.	☐	☐	HARRIS
07.	☐	☐	HITACHI
08.	☐	☐	IBM/ROLM Systems Division
09.	☐	☐	INTECOM
10.	☐	☐	MEMOREX TELEX
11.	☐	☐	MITEL
12.	☐	☐	NEC
13.	☐	☐	NORTHERN TELECOM
14.	☐	☐	SIEMENS
15.	☐	☐	STROMBERG-CARLSON
16.	☐	☐	TOSHIBA
17.	☐	☐	OTHER

7. What operating systems do you utilize? (check all that apply)

1. ☐ CICS
2. ☐ IBM DOS
3. ☐ MVS
4. ☐ UNIX
5. ☐ VM
6. ☐ VMS
7. ☐ OTHER __________

8. Please indicate by vendor the number of mainframes/minicomputers installed in your network.

VENDOR	MAIN-FRAMES A	MINIS B
01. DEC		
02. IBM		
03. AMDAHL		
04. AT&T		
05. HONEYWELL BULL		
06. NCR		
07. DATA GENERAL		
08. WANG		
09. HEWLETT PACKARD		
10. PRIME		
11. TANDEM		
12. UNISYS		
13. CONTROL DATA		
14. OTHER		

9. Please indicate by vendor the number of microcomputers:

A) Presently installed in your network.
B) The approximate quantity you plan to install in the next 12 months.

MICROCOMPUTER VENDOR/ WORKSTATION	PRESENTLY INSTALLED A	PLAN TO INSTALL NEXT 12 MONTHS B
01. COMPAQ		
02. PCs based on 80386 chip		
03. IBM (PC,XT,AT)		
04. IBM (PS/2)		
05. APPLE (Macintosh)		
06. AT&T		
07. SUN		
08. APOLLO		
09. LAPTOPS		
10. OTHER		

10. What is your host network architecture? (check all that apply)

1. ☐ SNA
2. ☐ DECNET
3. ☐ OSI
4. ☐ GOSIP
5. ☐ MAP/TOP
6. ☐ OTHER __________

11. What is your LAN Operating System? (check all that apply)

01. ☐ 10NET
02. ☐ 3COM (3+, 3+open)
03. ☐ APPLETALK
04. ☐ BANYAN (VINES)
05. ☐ DCA (IRMALAN)
06. ☐ IBM (OS/2 EXTENDED EDITION)
07. ☐ IBM (PC Network)
08. ☐ MICROSOFT (LAN MANAGER)
09. ☐ NOVELL (NETWARE)
10. ☐ NOVELL (NETWARE MAC)
11. ☐ TOPS (TOPS)
12. ☐ OTHER ____________________

12. What is your LAN environment? (check all that apply)

1. ☐ Token Ring
2. ☐ ARCNET
3. ☐ Ethernet
4. ☐ Starlan
5. ☐ Other__________

NETWORK WORLD
The Newsweekly of User Networking Strategies

13. What is the scope of your involvement in purchase decisions for Network/Communications products + services? (check all that apply)

1. ☐ Organization-wide
2. ☐ Subsidiary/division wide
3. ☐ Department-wide
4. ☐ For multiple organizations (consultants)
5. ☐ Other ____________________

14. For which network hubs outside of the US do you have purchasing influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East

15. Write below the total number of sites for which you have purchase influence? ☐

16. Check ALL that apply in columns A and B

A) I am presently involved in the purchase process for the following products/ services:
B) I plan to purchase the following products/ service in the next 12 months:

	Presently Involved A	Plan to Purchase B	- COMPUTERS/PERIPHERALS: -
01.	☐	☐	Micros
02.	☐	☐	Minis
03.	☐	☐	Mainframes
04.	☐	☐	Front End Processors
06.	☐	☐	Terminals
07.	☐	☐	Printers
	A	B	- SOFTWARE: -
10.	☐	☐	Network Management
11.	☐	☐	Micro to Mainframe
12.	☐	☐	Network Security
13.	☐	☐	Call Accounting
14.	☐	☐	Data Base Management
15.	☐	☐	Systems Software
16.	☐	☐	Communications Software
17.	☐	☐	Applications Software
18.	☐	☐	Network Operating Systems Software
	A	B	- DATA COMMUNICATIONS -
20.	☐	☐	Modems (over 9.6kbps)
21.	☐	☐	Modems (under 9.6kbps)
22.	☐	☐	T-1 multiplexers
23.	☐	☐	Other Multiplexers
24.	☐	☐	Data Switches
25.	☐	☐	Matrix Switches
26.	☐	☐	Packet Switches
27.	☐	☐	Local Networks
28.	☐	☐	Protocol Converters
29.	☐	☐	Network Management Systems
30.	☐	☐	Terminal Emulation Boards
31.	☐	☐	Facsimile Machines
32.	☐	☐	Diagnostic Test Equipment
33.	☐	☐	Data Service Unit
	A	B	- TELECOMMUNICATIONS -
40.	☐	☐	PBXs (over 1000 lines)
41.	☐	☐	PBXs (200 - 1000 lines)
42.	☐	☐	PBXs (under 200 lines)
43.	☐	☐	Key Systems
44.	☐	☐	Automatic Call Distributors
45.	☐	☐	Voice Messaging Systems
46.	☐	☐	Channel Service
48.	☐	☐	Short Haul Bypass Equipment (Microwave, Infrared, etc.)
	A	B	- TRANSMISSION SERVICES -
50.	☐	☐	Switched Voice
51.	☐	☐	Dedicated Leased Line
52.	☐	☐	T-1
53.	☐	☐	T-3
54.	☐	☐	Digital Data
55.	☐	☐	Packet Switched
56.	☐	☐	Centrex
57.	☐	☐	Central Office LAN
58.	☐	☐	Satellite
59.	☐	☐	Fiber Optic
60.	☐	☐	On-Line Information
61.	☐	☐	Systems Integration
62.	☐	☐	Network Optimization
63.	☐	☐	Microwave
64.	☐	☐	Cables, Connectors, Baluns
65.	☐	☐	ISDN
66.	☐	☐	EMail

17. Estimated value of networking equipment and services:

A) Which you helped specify, recommend or approve in the last 12 months?
B) Which you plan to help specify, recommend or approve in the next 12 months?

	A	B	
01.	☐	☐	$25 million and over
02.	☐	☐	$20 - $24.9 mil
03.	☐	☐	$10 - $19.9 mil
04.	☐	☐	$5 - $9.9 mil
05.	☐	☐	$1 - $4.9 mil
06.	☐	☐	$500,000 - $999,999
07.	☐	☐	$250,000 - $499,999
08.	☐	☐	$100,000 - $249,999
09.	☐	☐	$50,000 - $99,999
10.	☐	☐	under $50,000

18. Estimated gross annual revenue of your entire company/institution: (check one only)

1. ☐ over $10 billion
2. ☐ $1 to $9.9 bill
3. ☐ $500 mil to $1 bill
4. ☐ $100 to $499.9 mill
5. ☐ $50 to $99.9 mill
6. ☐ $10 to $49.9 mill
7. ☐ $5 to 9.9 mill
8. ☐ under $5 mill

19.

A) Estimated number of employees for your entire corporation: (check one in column A)
B) Estimated number of employees at this location: (check one in column B)

	A	B	
1.	☐	☐	over 10,000
2.	☐	☐	5,000 - 9,999
3.	☐	☐	2,500 - 4,999
4.	☐	☐	1,000 - 2,499
5.	☐	☐	500 - 999
6.	☐	☐	under 500

20. When do you plan to implement ISDN?

1. ☐ Currently testing
2. ☐ 12 - 24 months
3 ☐ 24 - 36 months
4. ☐ 36 + months
5. ☐ not implementing

9505NWW

MAP 3.0 is gaining momentum, raising user hopes for products

But many users not ready to commit to full-scale 3.0 nets.

By Paul Desmond
Staff Writer

MEMPHIS, Tenn. — Attendees at the North American MAP/TOP Users Group meeting here last week said they are encouraged by the growing acceptance of the MAP 3.0 standard and are looking forward to a new round of MAP/TOP products.

Users pointed to dramatic revenue growth figures cited by some vendors of Manufacturing Automation Protocol/Technical and Office Protocol products as evidence that MAP is gaining momentum, though most admitted they are still just testing the technology.

The users came to the conference to learn from industry leaders such as Boeing Computer Services Co. (BCS), which detailed its strategy to use the standards to tie together disparate corporate networks.

Laurie Bride, manager of network architecture in BCS' Network Support Services Division, described to some of the 225 conference attendees how MAP/TOP is an integral part of that strategy.

While generally enthusiastic about the technology, Bride said after the session that, unlike some of the users present, she was not satisfied with the number of MAP products available.

"You have to buy pieces from different sources, and there's no guarantee they'll run together," Bride said. That forces users to integrate the pieces themselves, which is the kind of chore that standards are designed to eliminate.

Lack of available products recently prompted BCS to opt for a Digital Equipment Corp. DECnet network rather than a MAP net for a sheet metal plant within Boeing's Commercial Airplanes Division, Bride said ("Boeing taps DEC for big systems integration job," *NW*, March 27).

Although the request for proposal for that project called for MAP, the division was not impressed with the vendor responses and instead opted for DECnet as a migration path to MAP, she said.

Vendors, however, said they are just now realizing the fruits of their labors that went into preparing for the Enterprise Networking Event '88 International in Baltimore last June. Products incorporating advances made for that MAP/TOP extravaganza are just now becoming commercially available.

As an example of the emerging products, Hewlett-Packard Co. and Allen-Bradley Co. demonstrated interoperability between an Allen-Bradley PLC-3 Programmable Controller and an HP 9000 Series 800 minicomputer.

New MAP 3.0 boards from each vendor were installed in their respective products, enabling the devices to exchange data without the use of additional gateway devices. The demonstration was intended to show that off-the-shelf products could support MAP 3.0.

Other vendors related their own success stories. Computrol, Inc. and Concord Communications, Inc. both reported revenue growth of 70% for the first quarter of 1989, compared with the corresponding quarter last year.

"That's definitely a dramatic shift from the past, and it's due to the stability of MAP 3.0," according to Concord President Tony Helies. He attributed the sales growth to users, not to OEM deals.

Many users were encouraged by the revenue growth rates of MAP/TOP vendors.

"It's been nine months since Enterprise, and the products are just beginning to emerge," said John Eichler, General Motors Corp.'s director of advanced manufacturing engineering and newly elected treasurer of the Information Technology Requirements Council, which oversees the North American MAP/TOP Users Group.

Eichler said MAP/TOP progress is due, in part, to a previous freeze on the MAP 3.0 standard. That move ensured users that MAP products are a safe investment.

Other users agreed. "We've been in the doldrums for quite a long time. Things like 70% increases in sales in the last quarter give me a lot of optimism," said Randolph Knipp, technical associate with E.I. du Pont de Nemours & Co.'s petrochemicals department in Orange, Texas.

But, like many attendees at last week's meeting, du Pont is only testing MAP/TOP products and is not ready to install full-scale production networks.

"Some of du Pont's core group looking at the future is interested in jumping to OSI standards," Knipp said. "More are willing to wait for DEC and IBM to come out with OSI products."

One user, Larry Caley, senior communications engineer at Ravenswood Aluminum Corp. in Ravenswood, W. Va., detailed how his company is gradually migrating toward a plantwide communications system based on MAP 3.0. So far, the company has installed four local networks that are either based on MAP 3.0 or MAP 2.1, with a commitment from the vendor to upgrade.

One network automates the company's metal-casting function; another serves its technical laboratory; and a third supports the company's automated systems group, which develops process control software.

The fourth network is used for the evaluation and conformance testing of new products, Caley said.

Plans call for all the networks to be linked to a broadband cable backbone, a project for which Caley said he is awaiting funding approval. ◘

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INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

Only six years old, computer maker Compaq Computer Corp. has risen to No. 202 on *Fortune Magazine*'s annual listing of the nation's 500 largest industrial companies. Compaq, which moved up 80 places since last year's listing, reported record sales of $2.1 billion for 1988.

People & Positions

Dennis O'Brien last week was named executive vice-president of **McDonnell Douglas Network Application Services Co.** in San Jose, Calif.

O'Brien will be responsible for all activities of the network firm, which provides electronic messaging, electronic data interchange, point-of-sale transaction processing, and check- and credit-authorization services over the company's Tymnet net.

McDonnell Douglas Network Application Services is made up of two organizations: McDonnell Douglas Applied Communications Systems and McDonnell Douglas Payment Systems.

Previously, O'Brien was group vice-president of marketing, planning and development at TRW, Inc.

Harvey Wagner last week was named vice-president and chief financial officer at **Datapoint Corp.**, a San Antonio, Texas-based computer and communications company.

Wagner will be responsible for accounting, financial control, financial planning and MIS.

He will report to Robert Potter, Datapoint's president and chief executive officer.

Previously, Wagner was vice-president of finance and chief financial officer at American Microsystems, Inc., a semiconductor maker. ◻

AOS firms come under fire in House

By Gail Runnoe
Washington Correspondent

WASHINGTON, D.C. — Alternative operator service (AOS) providers and consumer groups squared off during a House subcommittee hearing earlier this month on whether legislation is needed to curb abuses by AOS companies.

The hearing, which was held by the House Subcommittee on Telecommunications and Finance, focused on AOS legislation introduced earlier this year by Rep. Jim Cooper (D-Tenn.). He contends that a Federal Communications Commission order issued in February is insufficient to guarantee that AOS providers charge users reasonable rates.

The FCC order requires AOS providers to put labels on public phones they service, have operators identify their firm to callers, provide rate information when asked and transfer calls to other carriers at the caller's request.

The FCC order was issued after two consumer groups, the Telecommunications Research and Action Center (TRAC) here and Consumer Action in San Francisco, filed a complaint with the agency against five AOS providers that they claimed charged rates in some cases 250% higher than those of AT&T ("Telecom group pushes FCC to tighten AOS restrictions," *NW*, March 13).

The FCC said the restrictions it placed on AOS providers would give consumers information that would help them refuse service from companies whose rates they deemed excessive.

The order did not address the issue of AOS provider rates, explaining that a carrier's rates could not be found unjust or unreasonable simply because they exceed those of other carriers.

Subcommittee chairman Edward Markey (D-Mass.), however, said he is unconvinced that market forces will provide sufficient consumer price protection.

AOS providers have an incentive to charge higher rates so they can pay larger commissions to their clients, typically users such as hotels, colleges and hospitals, as well as companies that operate pay telephones.

Cooper's bill, while it includes many of the same disclosure provisions named in the FCC order, also identifies measures that address the controversial AOS rate issue.

Under the bill, AOS firms would be prohibited from knowingly charging for uncompleted calls; call splashing, which is transferring a call to another carrier and billing the caller from the

(continued on page 12)

INDUSTRY BRIEFS

Digital Communications Associates, Inc. (DCA) recently reported a drop in fiscal third-quarter earnings of approximately 40%, compared with earnings for the similar period last year. DCA's third-quarter revenue fell about 15%.

DCA's earnings for the third quarter ending March 31 were $7.3 million, down from $12.5 million for last year's third quarter. Last year's figures included a onetime $1.9 million gain from the sale of DCA's shares in Ungermann-Bass, Inc. at the time of Tandem Computers, Inc.'s acquisition of that firm.

Revenue for the third quarter was $50.3 million, compared with $59.2 million for the third quarter last year. DCA's fiscal year ends June 30. DCA said the earnings drop was due in part to expected losses reported by **Digital Transmission Systems, Inc.,** a Duluth, Ga.-based T-3 to T-1 digital cross-connect manufacturer DCA acquired in December 1988.

DCA, based in Alpharetta, Ga., said it will introduce several new wide-area network and computer communications products during the next three months. Although it declined to reveal details about the products, the company said it expects them to bolster its competitive position. DCA also plans to lower prices for some existing wide-area net products, as well as to increase the size of its wide-area net sales force and its research and development staff. To increase sales of its personal computer communications products, DCA is also developing an incentive program targeted at value-added resellers.

DCA Chairman and Chief Executive Officer Bertil Nordin said DCA has reached a middle ground between older, maturing products and newer products in their final stages of development. "We currently expect it will take 12 to 18 months for our newer products to provide the foundation that we hope will begin to move the company forward." he said. ◻

Novell braces itself for stiff competition

Firm bolsters its NetWare offering in attempt to stave off encroachment by LAN Manager rivals.

By Bob Brown
Senior Writer

PROVO, Utah — Novell, Inc. is facing serious challenges to its leadership in the local network market, but the company and analysts say Novell is taking the steps needed to remain an industry leader.

As acceptance of the OS/2 operating system increases, users are weighing new options for networks of OS/2-based personal computers. Those options include various vendors' implementations of Microsoft Corp.'s OS/2 LAN Manager, as well as IBM's LAN Server.

Novell is responding to these challenges by enhancing the capabilities of its NetWare network operating system, including beefing up its links to other vendors' products. Novell is likely to suffer some erosion of its current 50%-plus share of the local net operating system market, analysts said, but the company's competitive moves and continued growth in local network sales should prevent any major losses.

New generation

"We're at a generational change in the PC industry," said Louis Giglio, an analyst at Bear, Stearns & Co., Inc., a New York-based investment firm. Users are deploying more powerful desktop machines and shifting to the OS/2 operating system, which is designed to tap the capabilities of those workstations. NetWare increasingly will be competing against network products such as LAN Manager that work hand in hand with OS/2.

"The 386- and 486-based machines really represent a gigantic leap in potential functionality at the workstation level," Giglio said. "With users going to OS/2 and having something like LAN Manager that might be synergistic, Novell is at a marketing disadvantage. They have to overcome that."

In addition, Novell faces a gang of rivals, according to Rich Edwards, a senior analyst at Robertson, Colman & Stevens, a San Francisco-based investment firm. NetWare will go up against LAN Manager products being offered by "an organized consortium led by Microsoft, rather than just 3Com [Corp.] with 3+," he said.

"The real battle is Novell against Microsoft," Edwards said. "Microsoft very clearly sees the growing importance of networking and the growing importance from a marketing standpoint of trying to present a coordinated front with the operating system."

Novell officials say the company's greatest challenge is educating users and its resellers that NetWare products can be used to tie together the major networks and computers on which most users rely. This is difficult because Novell's message is more complex than that of its competitors, said Craig Burton, Novell's senior vice-president of strategic direction.

Novell's Craig Burton

New vs. old

Novell also must convince users that the perceived "newness" of LAN Manager is not necessarily an advantage over what could be called Novell's "old technology," Burton said.

"There's a lot to be said about maturity and planning," Burton said. Unlike LAN Manager offerings, NetWare is a product that builds on current technology and encourages users to build on their existing networks, he said.

According to Burton, Novell plans to satisfy as many users as possible by offering products that support heterogeneous nets. Instead of shifting its product strategy to emphasize a particular operating system, Novell plans to support users of Macintosh, MS-DOS, Unix and OS/2 operating systems, he said.

Novell has taken a number of steps toward that goal. These moves include the recent introduction of the Portable NetWare network operating system and the company's proposed acquisition of Excelan, Inc., which analysts say gives Novell greater access to Unix and Transmission Control Protocol/Internet Protocol users, as well as Macintosh

(continued on page 12)

Novell's NetWare users remain loyal

Users of Novell, Inc.'s NetWare say they are satisfied with the network operating system and plan to continue using Novell products to meet their long-term networking needs.

Tom Scales, manager of technical services and micro development at Cal-Farm Insurance Co. in Sacramento, Calif., said his firm relies on two applications that only work on NetWare.

"We are too tightly tied to the applications" to consider a different operating system, such as Microsoft Corp.'s OS/2 LAN Manager, he said. "The applications are more important to us than what network operating system they run on."

The company's local network connects 27 workstations.

Stuart Carol, network project leader at Mutual of America Insurance Co. in New York, said his company is unlikely to migrate from Novell System Fault Tolerant NetWare to OS/2 LAN Manager in the near future because of cost concerns.

"We would have to purchase additional random-access memory and retrain staff," he said.

The Novell system "gives us good support, and its security is more than adequate," Carol said. Novell's recently announced plan to purchase Excelan, Inc. and the scheduled release of Portable NetWare has given Carol confidence that Novell will be able to supply products to serve his networking needs.

Novell "definitely seems to be moving in the right direction," he said.

— *Gail Runnoe*

AOS firms come under fire in House

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transfer point, not the point of origin; and charging consumers a higher rate than the common carrier on calls billed to an interstate common carrier's billing card.

Representatives from the two largest AOS providers, International Telecharge, Inc. of Dallas and National Telephone Services, Inc. (NTS) of Rockville, Md., testified that tying AOS rates to common carrier rates is unfair. Carriers such as AT&T in many cases incur lower costs than smaller AOS firms to provide operator services.

Brad Mutchelkanaus, secretary and general counsel for NTS, said adoption of the Cooper bill at this time would be "unnecessary and unwise. The normal operations of the marketplace, combined with active oversight by the FCC and by state commissions," he said, "are in the process of correcting those problems identified by the legislation."

However, Steve Hewlett, commissioner of the Tennessee Public Service Commission, urged Congress to act on the bill. "The real AOS problem is excessive rates," and that issue was not addressed by the FCC order, he said. The best approach would be to implement a rate cap, said Hewlett, who spoke on behalf of his own and other state regulatory agencies. ◪

Novell braces itself for stiff competition

continued from page 11

environments. The company has also offered NetWare For Macintosh.

Meeting changing user needs and challenges from its rivals is nothing new for Novell, Burton said. Over the years, Novell has successfully met a number of challenges similar to those presented by the emergence of LAN Manager. "I'm feeling pretty good about our strategy," he said.

Setting itself apart

Gail James, president of LanQuest Group Corp., a Santa Clara, Calif.-based consulting firm, said that Novell is being challenged to differentiate itself from its competitors — something that was easier to do in an MS-DOS environment than in the emerging OS/2 environment.

He agreed with Burton that a key method for differentiating itself would be for Novell to provide users with painless and efficient connections to non-Novell networks.

So far, Novell has earned points with industry watchers for articulating its network strategy more clearly than its opponents, said Robertson Stevens & Co.'s Edwards. For that reason, he said he believes Novell's existing market share will not crumble in the face of competition.

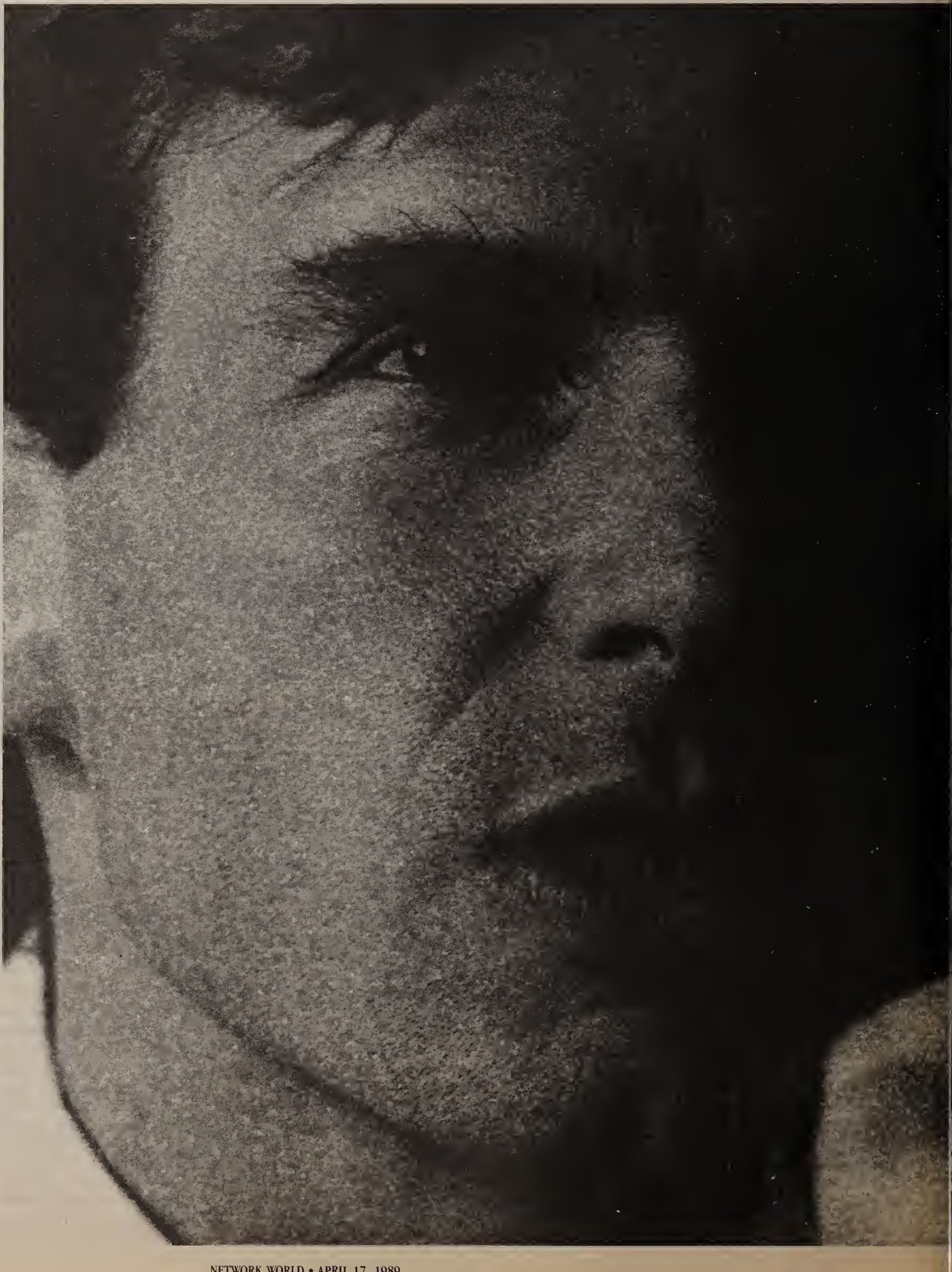
In fact, none of the analysts interviewed by ***Network World*** foresee a significant decline in Novell's market share over the next five years. Estimates of that market share vary from 50% to 70%.

Because the local network market is on an upswing, success for NetWare rivals will not necessarily come at Novell's expense. There is room for growth for both Novell and its foes, said Nancy Kirk, director of research for The Sierra Group, a Tempe, Ariz.-based market research firm.

"LANs are not a zero-sum game," Kirk said.

However, Novell promises to remain strongest among its existing customer base, said Giglio of Bear, Stearns.

"I don't think LAN Manager is going to end NetWare's existence," he said. "If you look at the people using [NetWare], their networks grow. Speaking from our own experience, we started out with about 100 PCs on our Novell network, and now we've got between 400 and 500 PCs on it." ◪



AT&T unveils ambitious EDI service plans

continued from page 6

the AT&T Unified Messaging Architecture on which these services are based, along with industry-specific applications to provide users with value-added electronic messaging products.

- A partnership with Telecom Canada to offer the first North American X.400 standard connection for exchanging EDI documents. The service will link AT&T EDI and Telecom Canada's TradeRoute EDI service.
- An agreement with ACS Network Systems, Inc. to let AT&T co-market ACS' minicomputer-based EDI translation software. AT&T does not currently provide premises-based translation software.
- A Vendor Software Interface Program, which makes AT&T EDI network interface specifications available for integration with selected vendors' EDI translation packages. Vendors that are now participating in the program are TranSettlements, Inc., Release Management Systems, EDI Solutions, Inc. and EDI, Inc.

Dalton said AT&T is pitching its EDI service to a number of industries, including telecommunications, health care and retail. The company charges a $120 annual administration fee for the service, while a typical 7,500-character message costs $1 to transmit.

The company is also busy exploring future AT&T EDI services, including the possibility of sending EDI via Integrated Services Digital Network links instead of by the current store-and-forward method.

ISDN would offer users even greater benefits from EDI since the process could become more interactive, Dalton said. "EDI could really drive ISDN," he said. "It's a perfect match."

AT&T itself is the biggest user of AT&T EDI. Bill Ebben, group vice-president of AT&T's Contract Services Organization, said in the keynote address at the conference that AT&T is saving millions of dollars by using EDI to support just-in-time manufacturing techniques as well as automated purchase order and invoice processing operations.

"EDI is much more than a way to reduce paper-handling costs at AT&T," Ebben said. "We view EDI as a strategic application that integrates our internal information movement and management with that of our customers and suppliers."

Ebben detailed AT&T's use of EDI in the company's purchasing, manufacturing and financial operations.

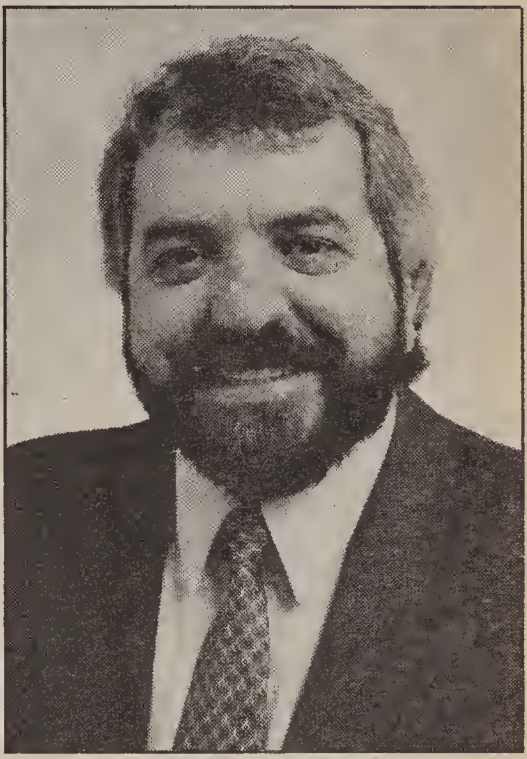
AT&T's central purchasing organization processed about one million, or 35%, of its transactions last year via EDI. The company has been using EDI since 1983 to send purchase orders and, more recently, to transmit schedule changes and order forecasts to its suppliers, Ebben said.

The benefits of using EDI for purchase orders include reducing manual errors from keying in information, speeding flow of information and assuring receipt of information, Ebben said. AT&T can concentrate on getting the most for its purchasing dollars instead of getting tied up in administrative details, he said.

In manufacturing, AT&T is using EDI to support its just-in-time strategy of inventory management, Ebben said.

"This requires close vendor-partner relationships," Ebben said. "EDI is the one effective way of facilitating the necessary communications to bring this about."

With EDI, AT&T is able to send materiel requirements automatically from its planning organization to its procurement group to its suppliers in a matter of days rather than weeks, Ebben said.



AT&T's Gary Dalton

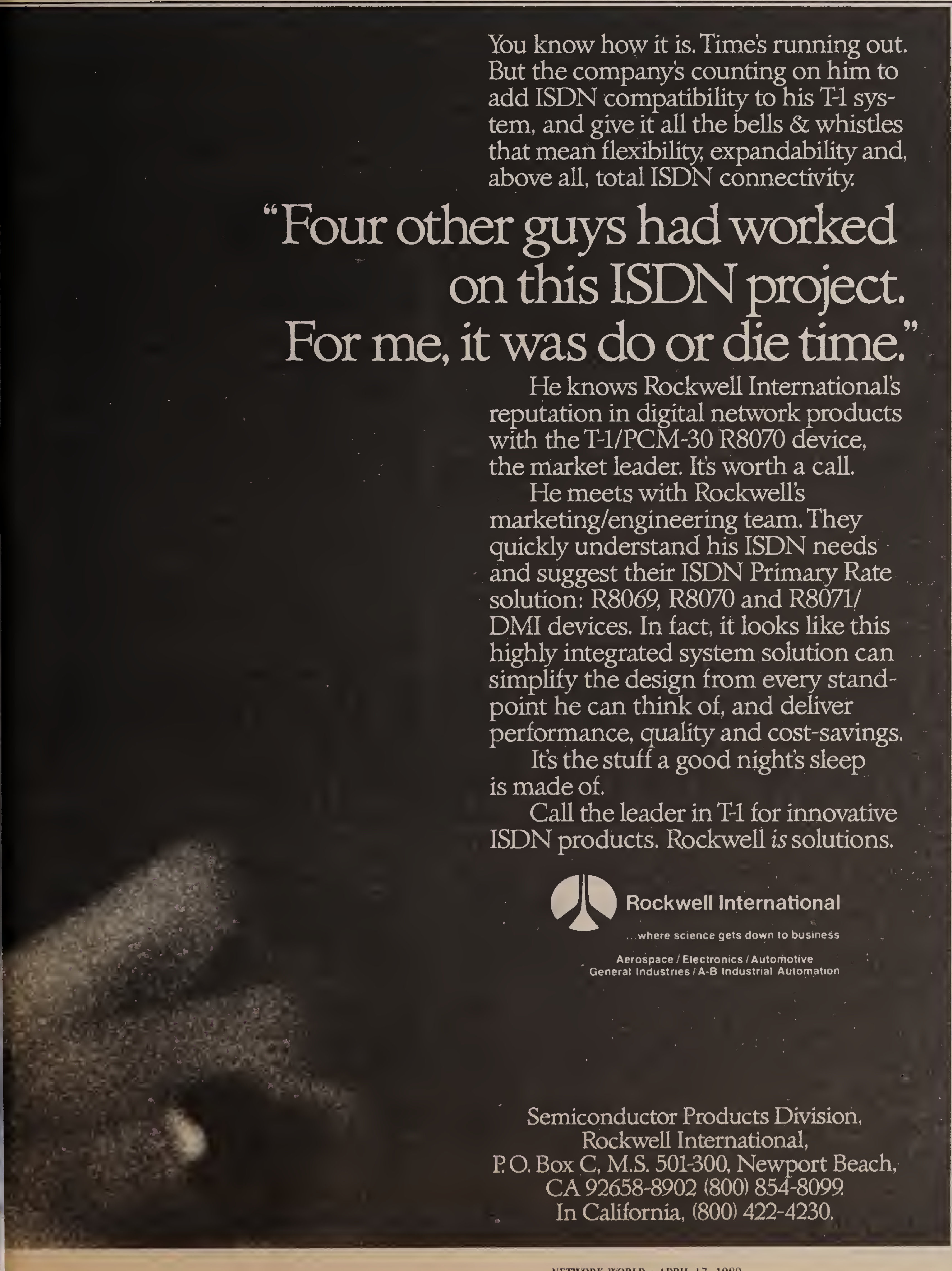
In its financial organizations, AT&T uses EDI to cut down on the billions of invoices processed annually, Ebben said. In 1988, AT&T developed a method of receiving invoices from suppliers in X12 format via EDI. Efforts are currently under way to make it possible to use EDI to receive carrier freight bills.

In addition, AT&T has been able to boost the number of its EDI partners thanks to inexpensive EDI translation software available off the shelf from a number of third-party vendors, he said. While a major concern of many small suppliers is that EDI is too expensive, a personal computer software and hardware package for EDI costs only about $5,000, he said.

"It allows us to get a supplier up and running on EDI in two to three weeks instead of two to three months," Ebben said.

He urged others in the EDI industry to work with national standards organizations to help foster widespread use of EDI, which would make U.S. companies more competitive on a global basis.

"In order to improve our competitive position," Ebben said, "we must implement EDI to make our operations more efficient as well as to advance our efforts in an overall approach to quality." ◪



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Worth Noting

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James Kennedy
Senior communications analyst
Stone & Webster Engineering Corp.
Boston

Carrier Watch

Pacific Bell recently signed on **Synercom Technology, Inc.** to digitize more than 300,000 manually drawn maps of its 13 million access lines serving subscribers in California.

The maps, now maintained by clerks at 22 districts throughout the state, will be digitized and stored on 11G bytes of centrally located disk space. Slated for completion by 1995, the project will allow Pacific Bell engineers to design new facilities and update the data base from their offices by downloading information to graphics workstations.

Ericsson recently announced contracts totaling $2.2 million for cellular radio equipment that will be used to provide cellular telephone service in Illinois and Indiana.

In Indiana, Ericsson will install its CMS 8800/S systems for Century Communications Corp., which operates a cable television system, four radio stations and seven cellular telephone systems.

Ericsson will also cut over two cellular systems in Illinois: one for Crowley Cellular Development Corp., an independent cellular telephone operator, and the other for Sudhir Khanna, a private service provider.

Harvard taps N.E. Tel for new Centrex

By Bob Brown
Senior Writer

CAMBRIDGE, Mass. — Harvard University recently announced a 10-year, $27 million contract with New England Telephone and Telegraph Co. to replace the school's existing analog Centrex network with a 22,000-line digital Centrex system.

Harvard will be New England Telephone's largest customer to convert from analog Centrex to Intellipath II digital Centrex service, according to Bill Blaisdell, Nynex Systems Marketing senior account manager.

Roughly 5,000 of the 22,000 Centrex lines will support Integrated Services Digital Network Basic Rate Interfaces, making Harvard one of the largest ISDN users in the Nynex Corp. region.

The network will be provided by New England Telephone in conjunction with Nynex Systems Marketing and Nynex Business Information Systems Co.

Harvard and New England Telephone have been working on the contract for more than a year ("Harvard U. opts for Centrex," *NW*, Feb. 15, 1988), but neither party would speak about it until last week.

Under the terms of the contract, New England Telephone will provide Intellipath II digital Centrex service, rewire 175 buildings with more than 5,000 miles of copper and fiber-optic cabling, install a fiber backbone connecting Harvard's major computing sites and provide ISDN terminal equipment supporting voice and data.

The telephone company will serve Harvard's main campus with Intellipath II Centrex from its Ware Street central office here. That switch will be linked with two diversely routed fiber cables to a remote switch module across the Charles River at the Harvard Medical School campus in Boston. The net will let users call any Harvard location by dialing five digits, Blaisdell said.

Intellipath II will support automatic route selection, call forwarding, station moves and changes, and ISDN features such as packet switching and simultaneous voice and data transport.

The network, which is currently being phased in, is scheduled to be completed by July 1990.

In August, a 5ESS switch installed at the Ware Street office will be linked to the existing analog Centrex serving switch via tie lines. When Harvard students return to school in September, their phones and computers will be connected to the new switch.

The remote switch module will be cut over in December to provide users at the Medical School with digital service. At around the same time, circuits serving groups of users at the Business School and on the main campus will begin to be transferred to the 5ESS.

According to Maurice Murphy, associate director of the Office of Information Technology at Harvard, "The benefit to us is that we are providing for future data and networking capabilities, and doing it with the most flexibility to accommodate the varying demands of the university."

WASHINGTON UPDATE

BY ANITA TAFF

MCI starts ISDN trial with Northern Tel. MCI Communications Corp. announced last week it has begun an Integrated Services Digital Network trial with Northern Telecom, Inc. to test the compatibility of MCI's services with Northern Telecom's Meridian SL-1 and SL-100 private branch exchanges. Using the Primary Rate Interface, MCI will test its Vnet, Prism and 800 services for delivery of automatic number identification, calling station identification and call-by-call service selection. MCI's switched 56K bit/sec, 900 and data services will be tested later in the trial. The trial is scheduled to last until the end of the year, according to an MCI spokesman.

AT&T puts discount plan on back burner. AT&T recently postponed the implementation of a new volume discount plan for users of its dedicated international services. The discounts would be based on a customer's traffic volume and length of contract. The discount was originally scheduled to take effect April 8 but was deferred until April 15 at the request of the Federal Communications Commission. The tariff has been protested by TRT Telecommunications Corp., which claimed the discount plan would discriminate against lower volume users.

BOC reveals disaster recovery blueprints

N.E. Telephone lays out prevention, recovery strategy at meet with more than 200 customers.

By Wayne Eckerson
Staff Writer

BOSTON — Executives from New England Telephone and Telegraph Co. recently laid out the carrier's disaster prevention and recovery strategy before more than 200 of its customers here.

Included in the half-day meeting was a brief overview of New England Telephone's plans to route traffic around a massive, federally funded construction project in downtown Boston that will displace hundreds of thousands of phone lines serving business and residential users in the metropolitan area.

The 10-year construction project calls for a major interstate highway that passes through the heart of Boston — the so-called Central Artery — to be resituated underground. The project also calls for the construction of a new harbor tunnel to the city's Logan Airport.

Less vulnerable

In opening remarks, Richard Jalkut, an executive vice-president at New England Telephone, said the carrier's network is less vulnerable to a catastrophic outage than Illinois Bell Telephone Co.'s net. A fire in Illinois Bell's Hinsdale central office last May knocked out service for 500,000 business and residential users served by the carrier.

"The changes Illinois Bell has announced in the wake of the Hinsdale disaster are already standard operating procedure at [New England Telephone]," Jalkut said. Last month, Illinois Bell said it plans to implement a new network design that will ensure continued service during a network disaster, as well as provide new alarm and fire protection systems ("Report lays blame for Hinsdale fire," *NW*, March 13).

While short on specifics, Jalkut said New England Telephone intends to spend $25 million between now and 1991 to protect its network from disaster.

A New England Telephone spokesman contacted later said the money will be spent on upgrading the carrier's temperature and humidity control systems as well as fire detection and suppression equipment in central offices and remote locations. New equipment will include early-warning fire detection devices and portable infrared scanning equipment that will inspect power supplies and show whether there is a danger of overheating.

In addition, the carrier plans to channel resources into training operating staff on emergency procedures and to strictly enforce disaster prevention policies through on-site inspections of all switching facilities, Jalkut said.

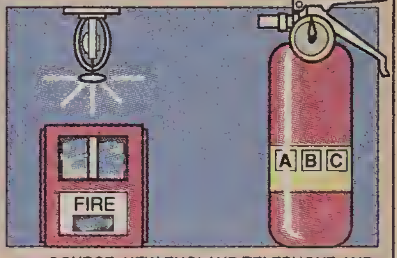
New England Tel's CO protection plan

Planned expenditures:

- New England Telephone plans to spend an extra $25 million between now and 1991 on environmental systems and fire safety equipment.

Purchases:

- Fire-suppression systems and devices that measure temperature and humidity in central offices.
- Early warning fire-detection devices and scanning equipment that monitors the temperature of central office switch power supplies.



SOURCE: NEW ENGLAND TELEPHONE AND TELEGRAPH CO., BOSTON
GRAPHIC BY SUSAN J. CHAMPENY

About 3,000 staff members have already taken emergency training classes, Jalkut said.

The big dig

The construction project in Boston will conflict with 36 New England Telephone cable and wire conduits, representing about 220,000 miles of copper and 5,000 miles of fiber lines, according to John Milan, director of the carrier's Central Artery Operations Division. Milan's division is planning alternate routing for the voice and data traffic affected by the construction project.

New England Telephone will reroute all traffic between central offices around Boston and add extra fiber lines between central offices north, south and west of the city to handle traffic that would otherwise go through the city. Most of the existing copper lines at the construction site will be pulled from the ground, Milan said.

The company is waiting for more detailed drawings and plans from the Commonwealth of Massachusetts before it decides how it will reroute local calls around

(continued on page 16)

Users skeptical about Mexican telco's $14b net upgrade plan

By Wayne Eckerson
Staff Writer

MEXICO CITY — In an effort to attract foreign investment in Mexico, the state-owned Telefonos de Mexico S.A. telephone monopoly recently announced it will spend $14 billion over the next six years to overhaul its phone network.

Although the move would benefit U.S. companies that do business in Mexico, U.S. network managers and other industry observers questioned whether "TelMex" could deliver on its promises.

"Their plan is fine and good, but where are they going to get $14 billion?" asked Indu Singh, president of Telecon International, a telecommunications consulting firm located in Burke, Va.

Tom Kelsey, a commercial officer at the U.S. Embassy in Mexico who tries to encourage U.S. investment in Mexico, said he was pleased by the announcement but added that the critical question is how quickly TelMex will deliver the upgrade.

"Key government and business officials are moving with uncharacteristic speed to effect change, but by U.S. standards, everything is moving slowly," he said.

In a presentation before large business users two months ago, TelMex said it intends to use the $14 billion to implement digital switches in a majority of the country's central offices, triple the number of new residential and business subscriber lines, and expand the number of leased data lines available to business, according to Javier Ruiz, a computer services manager at Ford Motor Co. here.

Ruiz also said TelMex announced it would offer enhanced services such as Integrated Services Digital Network offerings.

A recently issued study by the Mexican Association for the Defense of the Consumer said that 20% of Mexico's 4.4 million telephone lines and nine million telephones do not work.

According to Singh, there are many indications that the government of President Carlos Salinas de Gortari will allow private companies, including foreign firms, to buy 10% to 20% of TelMex in order to generate the needed capital.

The move would be in keeping with Salinas' efforts to liberalize the Mexican economy to spur growth and foreign investment, Singh said. Since coming to office last December, Salinas' government has announced the privatization of 36 government-run businesses.

"Salinas thinks that privatization would help make the country's phone system more efficient and more quickly bring to market enhanced services that large foreign companies need to conduct business here," Singh said.

Mexican authorities have not divulged specific plans for future ownership of TelMex services, Singh said, but he and other observers expect the government to announce its intentions before the end of the year.

Upgrades needed

Network managers of U.S. firms are moving ahead with plans to bypass TelMex lines, when possible, to achieve adequate levels of network efficiency and service quality.

Robert Ravinski, a network communications/systems specialist with The Kendall Co., a health care product manufacturer based in Boston, recently traveled to his company's manufacturing plant in Tijuana, Mexico, to determine whether to install a microwave link between the plant and administrative offices located 15 miles across the border in Chula Vista, Calif.

"If it rains in Tijuana, all the phones go down. We decided a microwave link that would carry our voice and data between sites was a safer, more reliable option than dealing with TelMex," Ravinski said.

Four years ago, Kendall spent a year trying to convince TelMex to install a 9.6K bit/sec data line from the Tijuana plant to the border, he said.

"The quality of service you received depended on what Mexican authorities you knew," Ravinski said. "[TelMex] might have great plans, but I wouldn't hold my breath waiting for them." ◪

BOC reveals disaster recovery blueprints

continued from page 15

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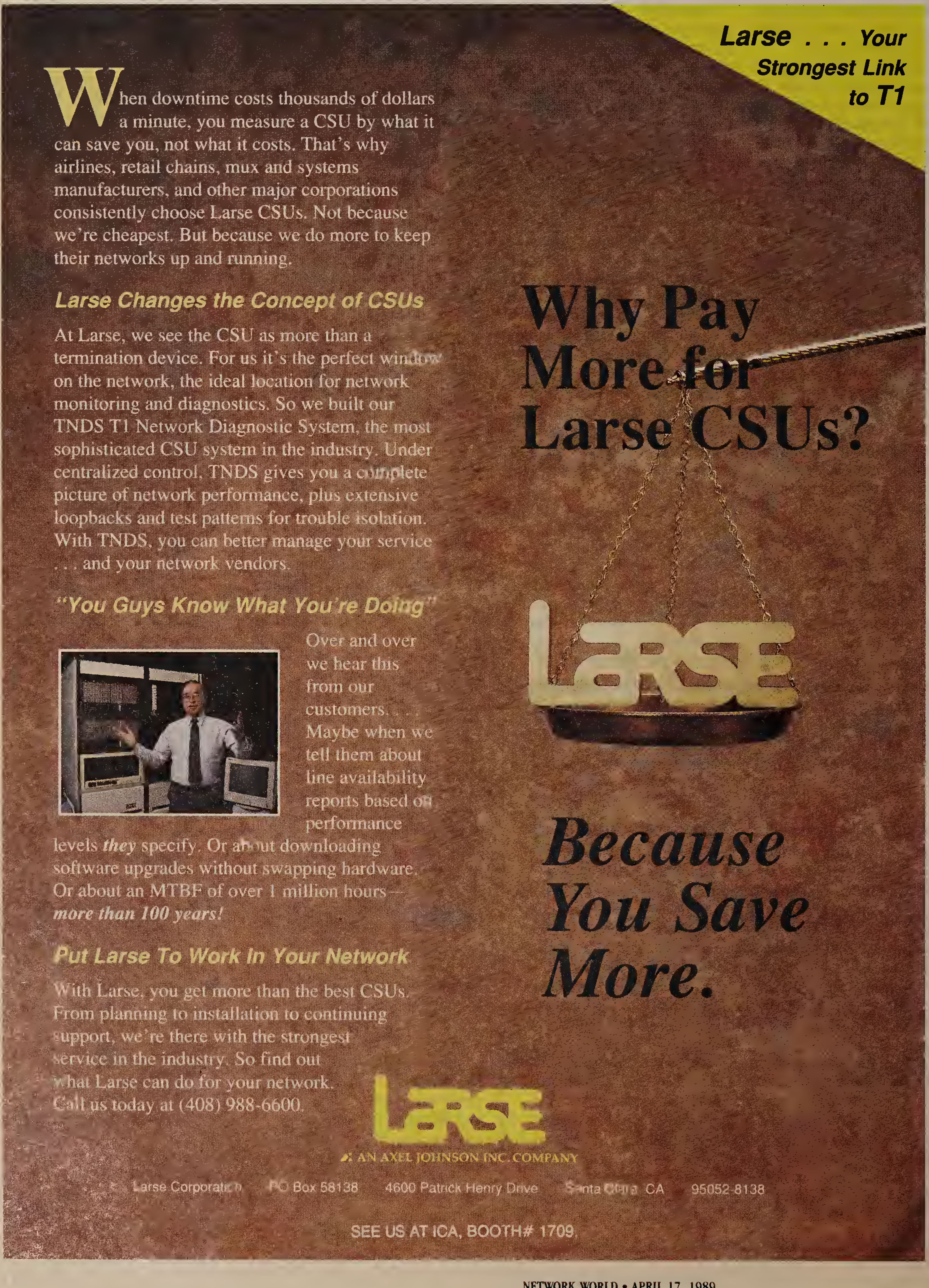
Multiple paths

Diverse alternate routing is a critical component of New England Telephone's strategy to increase the survivability of its network, said Ann Kirby, director of network planning at the carrier.

That strategy complements the company's plan to deploy almost 100,000 miles of new fiber-optic cable in its interoffice network and local loops by 1991, she said.

"Each time we go into the network to add fiber, we will assess whether it is financially and physically feasible to establish a new alternate path between sites," Kirby said. "The more fiber we add, the more opportunity we have to create multiple paths out from any [New England Telephone] office or customer site." ◪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Users skeptical about Mexican telco's $14b net upgrade plan

By Wayne Eckerson
Staff Writer

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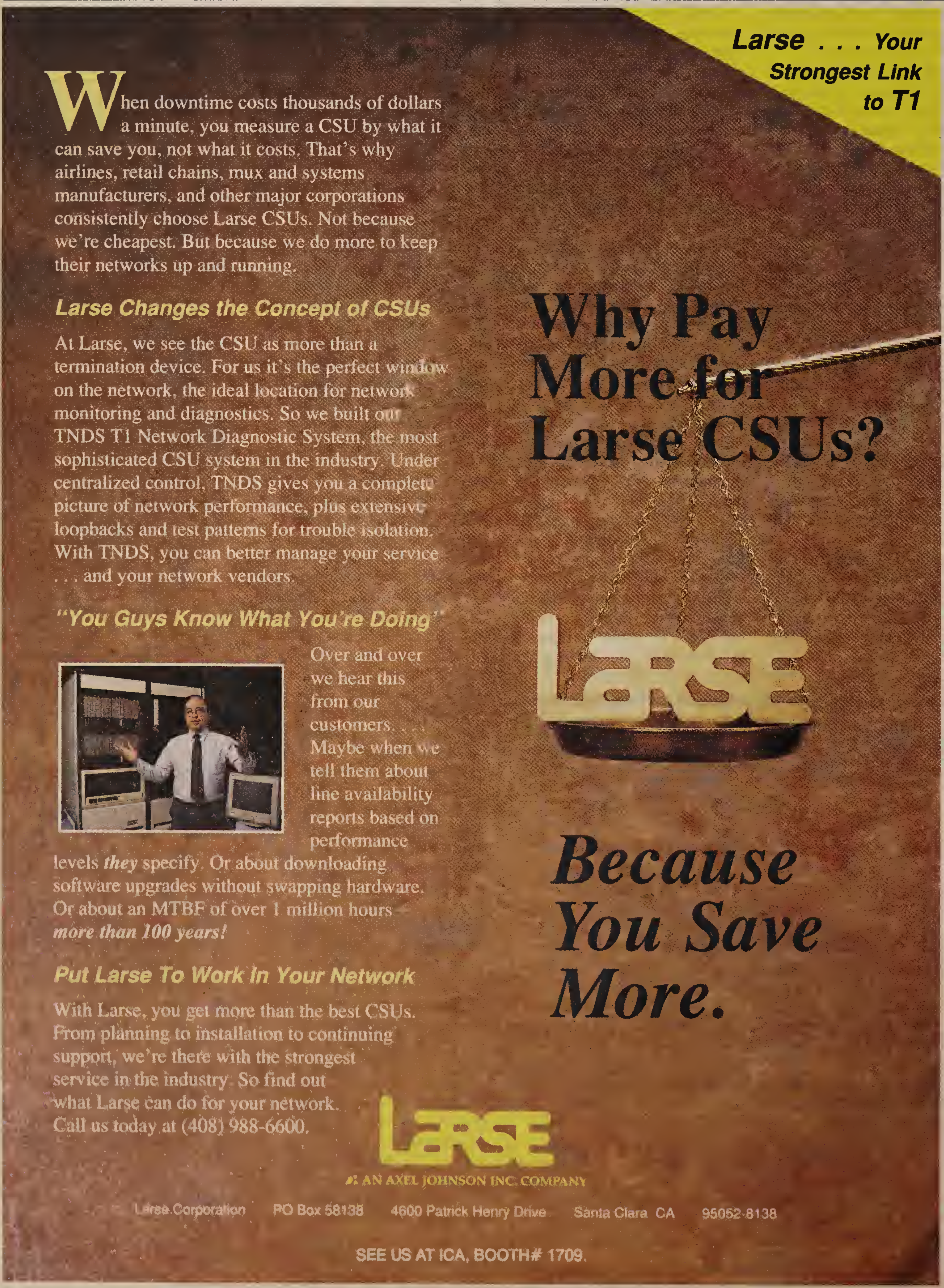

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DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

"ISDN has to be broken into two parts. One, the physical interface standard, which all vendors will adopt. And two, the implications of the 'S' — Services. At best, they're a gleam in Ma Bell's eye. [ISDN] sounds like a whole lot more than it is."

Bruce Smith
President and
chief executive officer
Network Equipment
Technologies, Inc.
Redwood City, Calif.

Data Packets

Digital Equipment Corp. last week announced network server versions of the new high-end additions to its MicroVAX 3000 series processors.

For the new VAXserver 3800 and 3900, DEC repackaged the chipset of its VAX 6300 minicomputer in the smaller cabinet of the MicroVAX 3000 series.

The new servers represent a performance increase of about one-third over their predecessors, according to the company.

The VAXserver 3800, with a starting price of $56,100, is equipped with 16M bytes of memory, a DEC TK70 streaming tape drive and controller, and a 400M-byte, 5¼-in. Winchester disk.

The VAXserver 3800 also comes with a DECnet adapter card and licenses for VMS File and Applications Services, DECnet and Local Area VAXcluster software packages, or a license for Ultrix, DEC's version of Unix.

The VAXserver 3900, which is priced starting at $84,900, has 32M bytes of memory, a 1.2G-byte disk drive and controller, the TK70 tape drive, DECnet adapter and the same software licenses.

Both servers are currently available. ◪

Unisys software lets users expand network node limit

CD4R1 also handles net switching and routing.

By Paul Desmond
Staff Writer

RENO, Nev. — Unisys Corp. last week announced new communications software for networks based on its Distributed Communications Architecture (DCA) that lets users expand their networks and makes them easier to manage.

The new software, Communication Delivery 4 Release 1 (CD4R1), is a set of communications software packages that run on Unisys 1100 and 2200 mainframes as well as on the company's Distributed Communications Processor (DCP) line of front-end processors.

The new software lets users build networks of up to 4,095 nodes, up from the previous limit of 255. It is based on the International Standards Organization (ISO) 8473 protocol, which automatically maintains and updates routing tables.

Unisys took the wraps off its new software at the Univac Scientific Exchange, Inc. users meeting here. According to Brian Pickersgill, program manager for DCP/DCA products, CD4R1stet includes three components:

- The first is the Communications Management System (CMS) 1100, which runs on Unisys mainframes and accepts data from DCPs.
- Next is the Message Control Bank (MCB), which also runs on the mainframe and routes data from CMS 1100s to a specific application or stores it on a central data base.
- The third and most important aspect of the new package, Pickersgill said, is the improvements it brings to Telcon, the DCP-based software that handles network routing and switching functions.

Telcon now supports the ISO 8473 protocol, also known as the Connectionless Mode Protocol. With the protocol support, Telcon users no longer have to update each DCP node in a network when another node is added or deleted.

Using ISO 8473, DCP nodes can update each other regarding network configurations and available data routes, Pickersgill said.

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Finances, politics loom as nat'l research net hurdles

By Gail Runnoe
Washington Correspondent

WASHINGTON, D.C. — Although some progress has been made on the development of a high-speed national education and research network since the project's supporters met here last year, the plan still faces financial and political obstacles.

More than 300 university, government and industry representatives gathered here recently for National Net'89, a conference organized by the Educom Networking and Telecommunications Task Force (NTTF) to rally support for the network project.

Current research and education networks are largely offshoots of the Defense Department's Advanced Research Projects Agency Network (ARPANET), formed in 1969, and the more recent National Science Foundation Network (NSFnet), which was developed by the NSF in 1987.

Educom, a group of colleges and other institutions, would like to see these existing networks, known jointly as Internet, expanded in both size and capability to improve the productivity of researchers nationally. Internet now reaches only about 500 universities.

Cosponsors of the conference included the Association of American Universities, the Association of Research Libraries, the National Association of State Universities and Land Grant Colleges, the NSF and others.

To build the desired national net, $400 million in federal funding will be needed over the next 10 years, according to a study by the White House Office of Science and Technology Policy.

Everyone benefits

Educom members support the need for this funding. They claim that, because the rewards of improved research would benefit all of society, it is appropriate that the bulk of the net's development and operation costs be federally financed. If funds have to be raised through user access fees, Educom said, smaller and rural colleges will be prohibited from fully utilizing the net's resources.

The Educom NTTF envisions a

(continued on page 18)

An OSI management checklist

- ☑ Spell out strategic value of net standards to the company.
- ☑ Enlist top-level management backing for the strategy.
- ☑ Create internal committees to sustain implementing the strategy.
- ☑ Work with end-user organizations to identify their communications needs.
- ☑ Tell end users about OSI and show how it will benefit them.
- ☑ Give users tools, staff and support for their own OSI pilots and projects.

Companies that want to create networks based on Open Systems Interconnection protocols need to plan carefully for an orderly OSI migration.

GRAPHIC BY SUSAN J. CHAMPENY

Boeing, Hughes map OSI migration paths

In absence of products, 2 firms initiate programs to coordinate planning, testing, implementation.

By John Cox
Senior Editor

FRAMINGHAM, Mass. — In an effort to nudge their organizations toward network standards, some corporations are implementing programs to mold OSI policies, cultivate organizational support and encourage pilot testing of the standards.

The Boeing Co. and Hughes Aircraft Co. have created high-level committees and positions to guide their drive toward Open Systems Interconnection. Both companies have begun the migration — even in the absence of OSI products — by devising an array of programs to implement OSI standards.

"You can't just sit back and wait," said Laurie Bride, manager of network architecture at Boeing Computer Services Co. (BCS), which supports Boeing's various divisions, such as the commercial airplane operations. "It does require a lot of planning."

For Boeing and Hughes, OSI is a key component of a broader standardization effort. Adhering to standards will enable networks to support the entire breadth of an organization, said Bud Huber, manager of corporate networking standards at Hughes' Communications and Data Processing (CDP) Division.

Both companies have put together a bureaucratic structure to support the migration to OSI. At Boeing, this process is in the hands of the Architecture Management Council, which oversees the establishment of standards for all of the Boeing divisions.

BCS staff assigned to these divisions serve on the council to represent the needs of their user communities and to reach agreement on standardization issues.

This jawboning can be alternately tedious and fractious, Bride said. Often, the various divisions are convinced their needs are unique, resulting in fierce loyalty to particular products. Division representatives also say they can't wait for a standard to emerge. "It's a slow process. Sometimes you have to wait for [a division] to shoot itself in the foot," Bride said. "You can advise them, but you can't cram it down their throats."

Of tigers and toilets

Hughes' movement toward OSI has been accelerating during the past five years, according to Huber. Among the changes Hughes made was to create Huber's position in May 1987 to coordinate advanced network integration.

> "You can't just sit back and wait," Bride said. "It does require a lot of planning."

▲▲▲

Later that summer, CDP tried to speed up OSI migration by creating what Huber described as a "tiger team" of hand-picked networking experts from the main operating divisions. In a few months, the team was ready with an OSI proposal for an open network architecture. Reaction was swift. "That went down the toilet," Huber said.

The proposal was technically elegant and a delight to tinker with, Huber said. But it failed because it would have created an overnight cutover to OSI, disrupting daily operations among the company's divisions and, in some

(continued on page 18)

Boeing, Hughes map OSI migration paths

continued from page 17

cases, eliminating existing communications capabilities.

CDP then set out to legitimize the movement to standards. The first step, in November 1987, was a terse one-page announcement, signed by Hughes President D.H. White, declaring interoperability through standards to be a formal company policy and assigning responsibility for carrying out that policy.

By April 1988, CDP had drafted its Standards and Advisories document, outlining the rationale for standards at Hughes and detailing a hierarchy of preferred standards. It won company backing. In general, the document said, when buying computer and communications systems, preference should be given to those complying with OSI standards.

The next step, now under way, is to spread OSI standards throughout Hughes by spelling out how users can apply the formal policy in specific instances and applications. Among other things, these "practices," as they're called, will drive home the point that CDP will service and support only those net products and services that conform to approved standards.

More than just talk

Boeing is further along than Hughes in implementing OSI within its proposed network architecture. One reason is the use of what's known as the the reference network, an OSI-compliant installation that works as a test bed for OSI pilots being run by the field divisions.

Boeing is moving on other fronts as well. It has just formally approved the OSI-based Manufacturing Automation Protocol/Technical and Office Protocol as an OSI standard. "We're in the throes of documenting a road map for how we will progress with that," Bride said.

Another step, planned for this September, will be to implement OSI protocols on Boeing's multiprotocol Internet, an internal, router-based network linking local networks throughout Boeing.

One of the first uses of the protocols will be an X.400 electronic messaging backbone, of which several components will be in place by year end. Eventually, Internet will be an exclusively OSI network. "Subnets will either have to be OSI-based or have a gateway into OSI," she said. ◪

Unisys lets users expand node limit

continued from page 17

That feature is especially important because Unisys recently announced a low-end, branch-level processor, the DCP/5, that can be added to user networks without having to update other nodes on the net.

The addition of the ISO 8473 protocol will also enable DCPs to detect new trunk lines and take advantage of those links when selecting data paths, Pickersgill said.

To ease that path selection process, Unisys has included new Dynamic Network Services routing functions in CD4R1.

"Dynamic routing allows us to select the best path based on trunk and node utilization rather than just the number of nodes," Pickersgill said.

In addition, users can change routing factors. If one circuit is especially congested, for instance, the software can configure alternate paths around it.

Although the new CD4R1 package includes many of the same features as IBM's Advanced Peer-to-Peer Networking, such as automatic network reconfiguration, Pickersgill said the two companies' networking strategies are very different.

"Our network does not rely on the host being available," he said. "You can go out there and put a bullet through every host and the network will still continue to run — allowing PCs to talk to PCs and Unix to talk to Unix and so on."

CD4R1 is scheduled to ship in July. Prices for the Telcon software range from $2,000 to $59,000. The CMS 1100 software costs between $7,812 and $78,750, and the MCB software ranges in price from $5,695 to $16,750. All prices are dependent upon configuration and equipment models. ◪

Finances, politics loom as hurdles

continued from page 17

three-level national network comprising: a federally sponsored interstate wideband backbone supporting at least one access node in every state, a mid-level tier of state and regional networks providing broad intrastate connectivity, and a third level composed of individual campus, government and industrial laboratories providing access to end users.

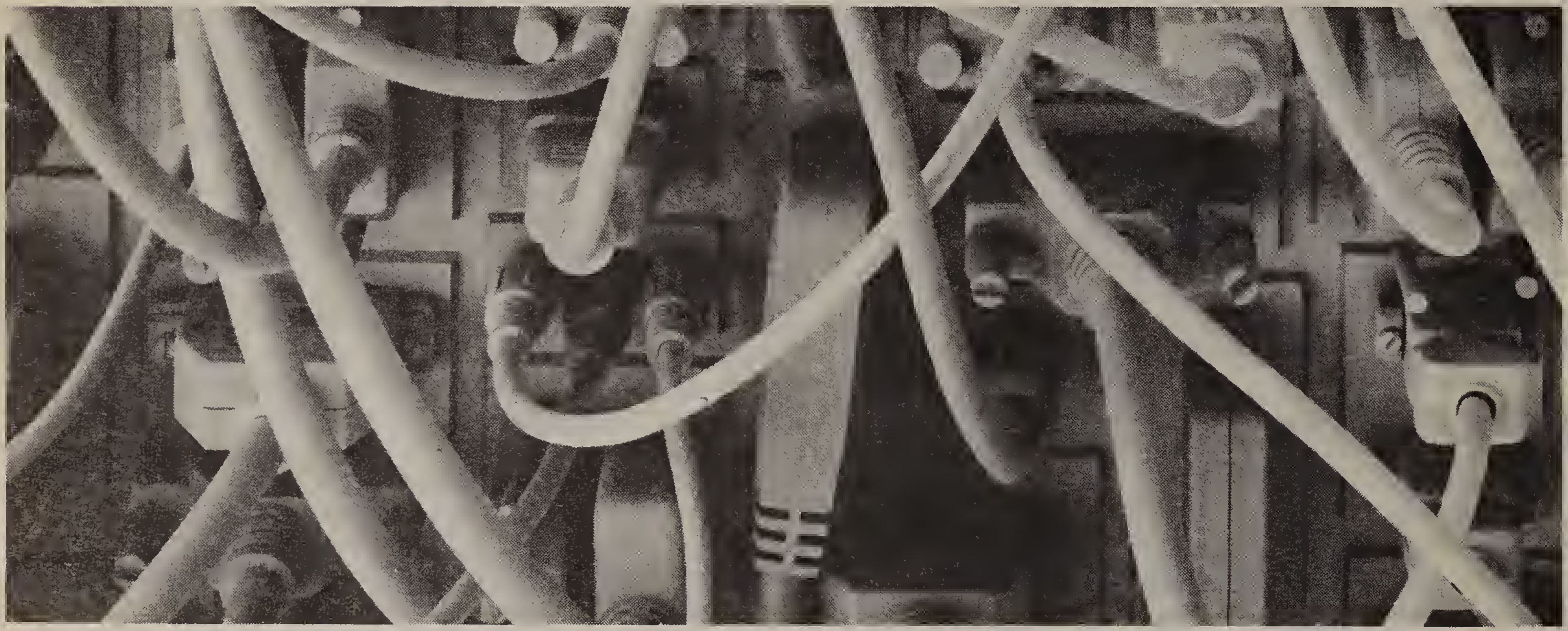
Since last year's Educom meeting, William Wulf, assistant director of the NSF in Washington, D.C., reported that Internet, the network that will be the basis for the National Education and Research Network, had been equipped with new T-1 lines.

Though the new lines increased capacity greatly, the network will again be saturated within 18 months at current usage rates. Traffic volumes double on the net every 4½ months; consequently, the network is expected to be upgraded with T-3 lines by the early 1990s, Wulf said. By the year 2000, it is expected to move data at gigabit-per-second speeds.

To ensure that there will be adequate funding to bring network development to this stage, Educom supports the enactment of congressional legislation to establish a national network policy. Such a bill was introduced in the last congressional session by Sen. Albert Gore (D-Tenn.) and is expected to be reintroduced this year.

Gore's original proposal called for Congress to approve the $400 million funding plan, which was deemed appropriate by the White House Office of Science and Technology Policy. ◪

Beat those multi-vendor technophobia blues.



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Worth Noting

> "At the end of 1988, only 15% of PCs worldwide were connected via LANs. This means there's still plenty of opportunity for minicomputer vendors like DEC, HP, Wang, Sun [Microsystems, Inc.] and Data General to wrest business away from PC LAN vendors."
>
> **Steve Wendler**
> Senior analyst
> Gartner Group, Inc.
> Stamford, Conn.

Netnotes

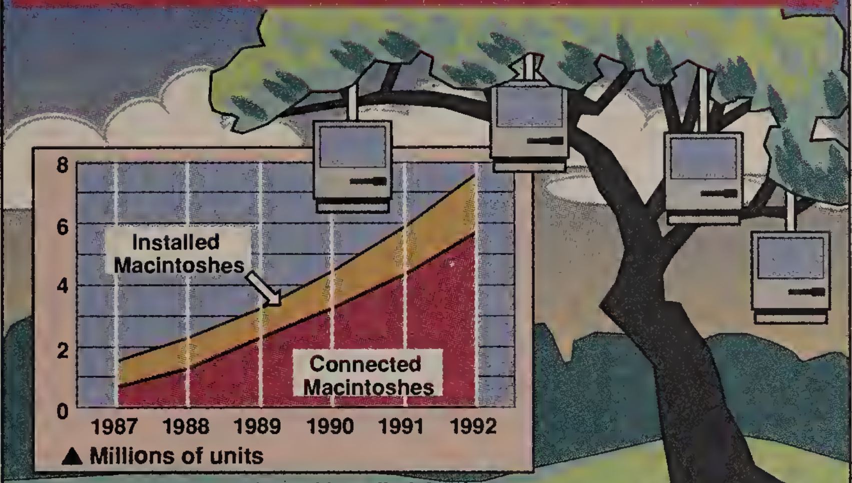
Xircom, Inc. of Woodland Hills, Calif., last week unveiled an external Ethernet adapter that connects to a lap-top personal computer's parallel port. The Pocket Ethernet Adapter is designed primarily to connect lap-top computers to local nets, but it can also be used with desktop systems that have no available expansion slots. The adapter comes with drivers for **Novell, Inc.**'s NetWare 2.0 and higher.

The product is available in two models. The PE10B2 has a thin Ethernet interface, and the PE10BX supports external media access units that attach to regular Ethernet cabling or unshielded twisted-pair wiring. Both cost $695 and are available now.

Arche Technologies, Inc. of Fremont, Calif., last week unveiled a $295 Ethernet board and a $165 Arcnet interface card at Comdex/Spring '89.

The Arche NetShare-E Ethernet adapter has 8K bytes of memory and interfaces to thin-wire Ethernet cable. The Arche NetShare-A Arcnet board features a 2,000-byte buffer. Both boards offer dip switches for setting I/O addresses. They have jumper-selectable interrupt channels and support remote booting of diskless workstations. ■

Macintosh connections ripen



Two years ago, only 45% of installed Apple Computer, Inc. Macintoshes were networked. Today, roughly 70% are linked and, by 1992, an estimated 75% will be connected together.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

LAN Manager usage won't transform local networks

Real changes to come with new applications.

By Laura DiDio
Senior Editor

Users and analysts say Microsoft Corp.'s LAN Manager will not radically alter local networks, at least not until applications become available to take advantage of the network operating system's advanced capabilities.

Early converts to LAN Manager said they expect to benefit initially from the software's multitasking capabilities and built-in file redundancy features, which are seen as improvements over MS-Net, Microsoft's predecessor to LAN Manager.

> Users won't see major changes until developers deliver distributed applications.
>
> ▲▲▲

Users won't see major changes to their local nets until software developers deliver distributed applications that run partly on the workstation and partly on servers in the network, analysts said. Microsoft claims that software developers will deliver such applications this year.

"Until applications become available — probably in about a year — the industry won't know how LAN Manager will impact LAN operations," said Lee Doyle, manager of local net research at International Data Corp. in Framingham, Mass.

End users won't see any big changes in local net operations until distributed applications for LAN Manager become available, agreed Pat Smyth, group product manager for local-area networks at AT&T in Morristown, N.J. AT&T is developing a Unix implementation of LAN Manager.

Those who converted to LAN Manager say Unix versions of LAN Manager will allow them to integrate DOS and OS/2 environments with Unix systems.

The U.S. Military Academy at West Point, N.Y., is one such user planning to install a Unix version of LAN Manager. "This will give us a common network operating system that supports 5,000 PCs, 22 Unix minicomputers and 25 servers on the same Ethernet backbone," said Col. Lanse Leach, associate dean of academic computing.

Unix-based versions of LAN Manager will run on the minicomputers positioned as servers in the local network, while other servers will run OS/2 LAN Manager, and personal computers will run a network software shell, enabling them to direct data requests to a server.

"Running derivatives of a single operating system will provide us with a common user interface," Leach said.

Software developers are enthusiastic about how LAN Manager's multitasking features will provide users with strategic business advantages.

LinkAge, Inc., a Toronto-based developer of personal computer and local net custom software packages, is building a debt trading package for Merrill Lynch/Canada, Inc. that is based on OS/2 LAN Manager and SQL Server, which is marketed by Microsoft and Ashton-Tate Corp.

The server-based software will enable Merrill Lynch traders to enter a trade, modify stock inven-

(continued on page 22)

Access/One delivers varied net services

Intelligent wiring concentrators let users offer various network services to desktop devices.

By Susan Breidenbach
West Coast Bureau Chief

SANTA CLARA, Calif. — Since January 1988, Ungermann-Bass, Inc. has quietly shipped 1,600 Access/One intelligent wiring concentrators, which allow users to deliver a variety of network services over standard telephone wire to desktop devices.

The Access/One provides centralized cable management to companies that want to use existing telephone cable as a data transmission medium. When equipped with the appropriate plug-in boards, the Access/One box can replace terminal servers and provide twisted-pair connections from personal computers and workstations to Ethernet and token-ring local nets.

The Access/One chassis is housed in a telephone wiring closet and is equipped with system modules that support different devices. The unit provides unshielded twisted-pair cable connections to desktop devices and can be linked to a coaxial or fiber-optic backbone.

Each chassis has 11 slots for plug-in modules, which can be mixed and matched according to customer needs. Ungermann-Bass currently offers six modules, including one that provides an interface to a backbone network and a supervisor module for network management.

Each terminal or workstation in an Access/One network plugs into a telephone wall jack, and changing devices is relatively easy. If, for example, an end users replaces a terminal with an Ethernet workstation, the telephone wire from the jack can simply be unplugged from the asynchronous module in the wiring closet and attached to the Ethernet module.

"We can now provide service to a wide variety of devices over the same telephone wiring," said Bryan Long, product marketing manager for Ungermann-Bass' Access/One line. He said the product's modularity maximizes network uptime because one module can be brought down

(continued on page 22)

Cornell, IBM join forces to study hospitality nets

By Bob Brown
Senior Writer

ITHACA, N.Y. — The Cornell University School of Hotel Administration recently said it will team with IBM in a three-year research project to study the use of computers and networks in hotel and restaurant management.

The project, which involves installation of IBM Token-Ring Networks and other equipment, will link the on-campus Statler Hotel and J. Marriott Executive Education Center with school facilities and enable students to study hotel operations. It will also show students how nets can be used to integrate hotel functions.

Six Token-Ring Networks will be installed and linked using a 16M bit/sec IBM Token-Ring backbone. The project, sponsored by IBM's University and College Systems organization, will also involve development of new technologies for educating students who plan to enter the hospitality industry.

Under the agreement, IBM will contribute $1 million worth of Personal System/2 hardware and software to Cornell. All told, however, the University will install 58 IBM Personal System/2 Models 50, 70 and 80 microcomputers and an Application System/400 minicomputer.

The equipment will be installed in a large, on-campus building that houses the hotel, conference center and academic facilities.

One Token-Ring will be installed in the hotel, two others will run through the conference center and three more will be put in academic facilities, said Associate Professor of MIS Dick Moore, the project director.

The Token-Ring Network in the Statler, a teaching hotel, will link about four Personal System/2s and be used to support check-ins, checkouts and other hotel operations, Moore said.

One of the two Token-Rings in the Marriott Executive Education Center will support about eight Personal System/2s in a conference center classroom, while the second will support Personal System/2s that attendees can use to

(continued on page 22)

The new COMPAQ DESKPRO 286e.
Further proof that what's on the outside,

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says a lot about what's on the inside.

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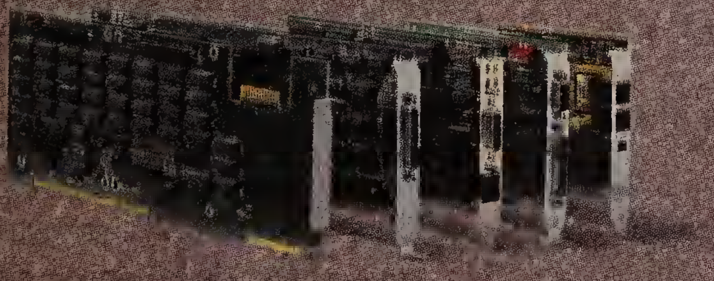

Five expansion slots give you room to grow: one for high-speed memory, and four for thousands of industry-standard add-ins.

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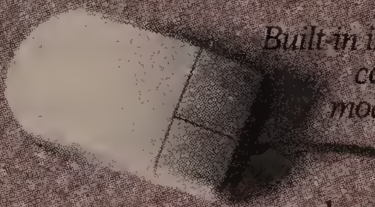

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Access/One delivers varied net services

continued from page 19

without affecting any others.

One of the first companies to use Access/One was Microsoft Corp., the largest microcomputer software developer in the world. Microsoft has about 400 file servers, 6,000 personal computers and 2,000 dumb terminals spread across its multiple-building headquarters in Redmond, Wash.

Microsoft bought Access/One so it could use unshielded twisted pair to deliver Ethernet services to its various devices, said Joe Monteleone, manager of corporate systems for Microsoft. "The way we run our async ports, we were running out of telephone closet space. The Access/One unit let us triple the number of devices we could stick in one data cabinet."

Another user, Wyeth-Ayerst Research Laboratories, Inc. in Radnor, Pa., has until recently been a mainframe operation, with dumb terminals and terminal-emulating personal computers spread across several buildings at its headquarters.

Last year, the company began installing local networks running Novell, Inc.'s NetWare and started looking for ways to beat the cost of traditional cabling.

Pulling more and more coaxial cable throughout the buildings was getting prohibitively expensive, particularly since 80% of the work force had been relocated within the campus during the past year, according to Rick Firru, supervisor of computer facilities for the company.

"We decided to install AT&T premises wiring and talked to a number of vendors that were offering twisted-pair products," he said.

Firru now has five Access/One units in four buildings, supporting a variety of 3270 and asynchronous terminals as well as personal computers. The concentrators are connected to a fiber-optic backbone currently running Ethernet, but they were installed with the intention of migrating to the Fiber Distributed Data Interface (FDDI).

View to the future

The Medical Center of Delaware in Newark purchased an Access/One as a networking platform to support its strategy of interconnecting its designated system standards: IBM mainframes running MVS, Digital Equipment Corp. VAX minicomputers running VMS and IBM Personal System/2s running DOS.

The 1,100-bed medical center has two buildings, 10 miles apart, connected by a T-1 line. The buildings contain numerous twisted-pair Ethernets running NetWare and an FDDI backbone more than a mile in length.

"We wanted to be able to put a PS/2 on the network and have it look like a 3270 terminal to a mainframe or an ASCII terminal to a VAX," said Ward Keever, vice-president of information services for the medical center.

"Ungermann-Bass' Access/One at the time was by far the superior product for connecting systems from multiple vendors," Keever said. ◘

LAN Manager usage won't transform nets

continued from page 19

tory, check stock prices and send a message all at the same time. "This is a capability that hasn't existed," said Bob Jull, president of LinkAge, which uses a 3Com Corp. 3+Open OS/2 LAN Manager net.

"LAN Manager technology will ensure that our applications and hardware are protected from failure," Jull said. This is accomplished through backup and recovery facilities in LAN Manager and data base file redundancy that is built into the SQL Server data base software, he noted.

AT&T's Smyth said the most significant changes LAN Manager is going to bring to local net operations will initially be enjoyed by network administrators.

When AT&T's Unix implementation of LAN Manager, to be called Stargroup LAN Manager/X, ships in the first quarter of 1990, it will make it easier for network administrators to change the network configuration than AT&T's current Stargroup Unix network operating system, Smyth said. Likewise, other LAN Manager products will offer that capability, he added.

LAN Manager/X will support access control lists, which can be used by a network administrator to grant access to files, peripherals and directories for a particular group or individual, Smyth said. The current Stargroup Unix offering, based on Microsoft's older MS-Net technology, only allows an administrator to assign resources to the entire network and not individuals or work groups within the network. ◘

Cornell, IBM join to study hospitality nets

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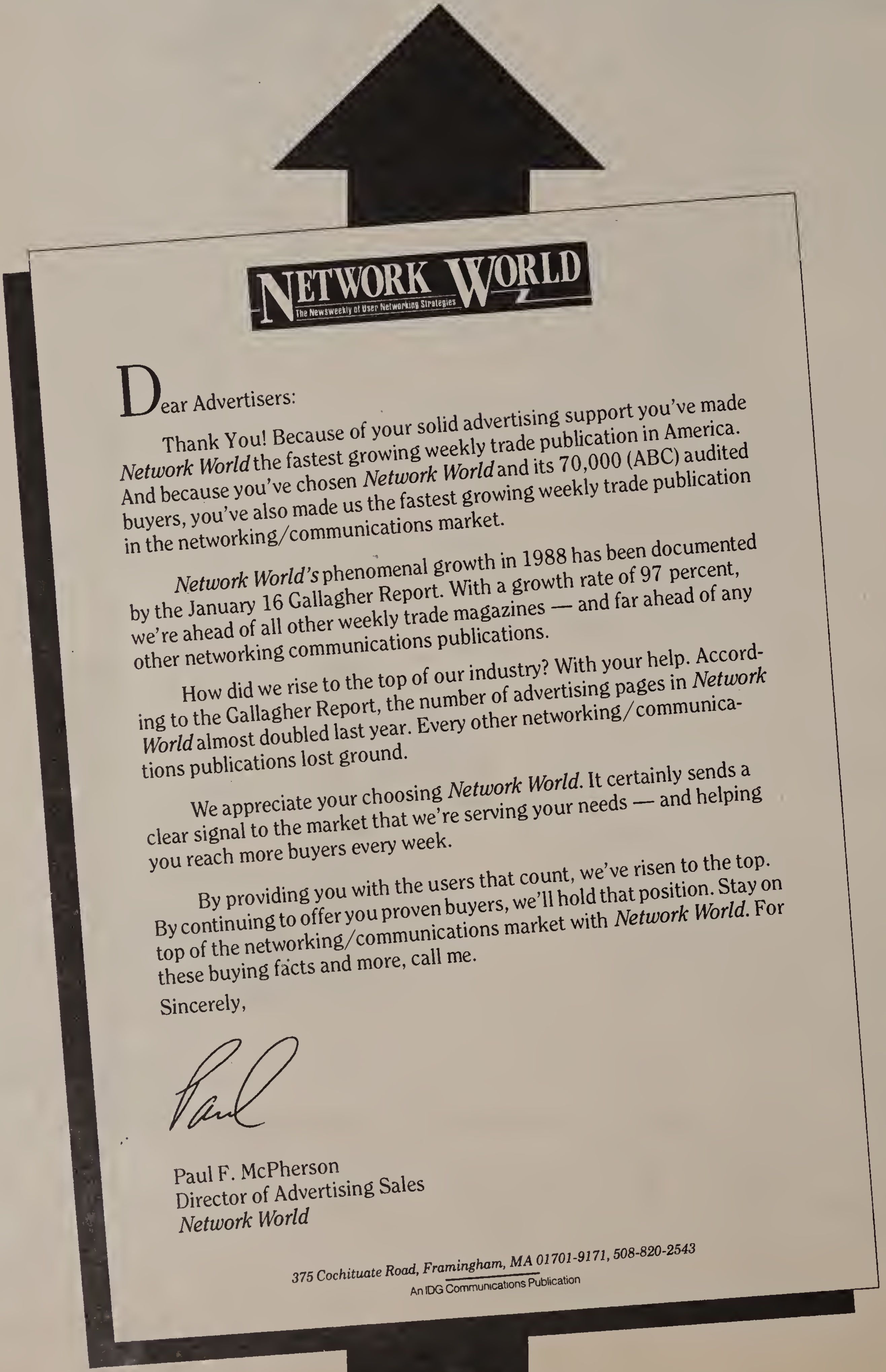
study and access data bases.

The three Token-Rings on the academic side of the building will be used by faculty and students to collect data from the hotel and conference center and for other research purposes, Moore said.

The Statler Hotel is "a real live data generator" that will be used as an educational tool, Moore said. "As we speak, people are calling in making reservations and checking in and checking out," Moore said. "That's a lot of data that we can analyze for such purposes as conducting staffing strategies." Moore said data from the hotel will be "laundered," in that guest names and room numbers will be altered so that private information is not dispersed among students. Token-Ring Network users will not have access to the hotel's business network either, he said. ◘



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Robert Allen
Chairman and chief
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AT&T
New York

Dialogue

How would you rate the performance of Dennis Patrick during his tenure as chairman of the Federal Communications Commission? What effect do you think his departure will have on the network industry?

"Overall, his record is quite good. He has had two or three major achievements, most notably the recent price caps ruling. He also did a fine job continuing the deregulation policies of his predecessors.

"It's hard to know the impact Patrick's departure will have until we know who his replacement will be. The next chairman can undo all of Patrick's initiatives or continue them. At the FCC, all things are subject to being revisited."

Glen Robinson
Professor of law
University of Virginia
Law School
FCC commissioner,
1974 to 1976

"Large users are indebted to Patrick for his procompetitive stance on major regulatory issues.

"How the FCC will change with Patrick's resignation depends on who replaces him. However, I feel that President Bush needs to appoint someone with a user's perspective and a strong background in technology and regulation. Historically, this slot has been a political giveaway."

Kenneth Phillips
Vice-president of
telecommunications policy
Citicorp
Director of
legislative affairs,
Committee of Corporate
Telecommunications Users
New York

Covia leverages Apollo net in hotel reservation service

By Sarah Vandershaf
West Coast Correspondent

ROSEMONT, Ill. — Covia Partnership recently unveiled Covia Reserve, a reservation service based on Covia's worldwide Apollo reservation network and targeted at small and midsize hotel chains.

Covia Reserve will link travel agents, hotel reservation desks and centralized reservation systems to ensure that reservations, prices and marketing strategies are consistent for all hotel chain locations.

"Covia Reserve gives any hotel the reservation capabilities of a large chain," said Paul Mercurio, Covia Reserve managing director. "It provides immediate room confirmation and ensures consistency in room prices between the travel agency and the hotel."

The system can tell whether a reservation qualifies for special discount rates that a hotel might offer, either for individuals or for convention groups.

"Covia Reserve also connects with [American Airlines, Inc.'s] SABRE, our prime competitor, and with other travel agency systems," he said. Covia Partnership is a subsidiary of United Air Lines, Inc.

Covia Reserve will also provide hotels with information they can use in their marketing strategy, Mercurio said. "Often, guests want the same things each time they stay at a hotel — a king-sized bed, a no-smoking room and the *Wall Street Journal* hanging on the doorknob at 6 a.m.," he said. The system can store guest profiles, which can be sent over the net each time the guest makes a reservation.

"Hotels need a central data base where they can compile marketing information so they can tell how much business they're doing with a given customer or travel agency," Mercurio said.

Hotels that opt for Covia Reserve are tied into the Apollo network via point-to-point leased lines. Apollo links 10,000 travel agencies in the U.S. and about three times as many locations around the world, Mercurio said.

Most of the travel agencies in the Apollo network use dumb terminals, a Covia spokesman said, but about 10% of the agencies have IBM Personal System/2 Model 50 intelligent workstations on IBM Token-Ring Networks. Data from the approximately 50,000 CRTs in the U.S. network is funneled through communications concentrators

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BOOK REVIEW

BY ERIC SCHMALL

Telecom book of limited value to net pros

The Dow Jones-Irwin Handbook of Telecommunications Management, James Green (Homewood, Ill.: Dow Jones-Irwin, 1989), $65.

A handbook is supposed to be a concise reference for a particular subject. While James Green's book is anything but concise, it does, to some degree, achieve his stated goal of being a "one-volume collection of telecom management techniques."

The Dow Jones-Irwin Handbook of Telecommunications Management is a ponderous, 24-chapter treatise on running a communications department. The book is well-reasoned, exhaustive and reliable. But experienced network managers will find the *Handbook* tedious. It treats in great detail subjects that most experienced managers already understand quite well. Only individuals who are new to this field or who need a solid primer on the fundamentals of communications management will benefit from reading this book.

Green warns that the *Handbook* presupposes a "good working knowledge" of communications technology and recommends that readers peruse his earlier works before attempting this one. Green, who is president of the Portland, Ore.-based

(continued on page 61)

Schmall is network systems manager for an insurance holding company.

MANAGEMENT PROFILE

▲▲▲

BY WAYNE ECKERSON

The Samaritan Corporate Center in Phoenix

PHOTOGRAPHY ©1989 JEFF NOBLE

Samaritan looks to net to cut costs

Samaritan's Robert McCrory

PHOENIX — In 1982, Congress passed the Tax Equity and Fiscal Responsibility Act (TEFRA) to control skyrocketing Medicare costs, ushering in a new era of budgetary restraint for U.S. health care providers.

But at Samaritan Health Services, a 2,000-bed chain of hospitals and clinics based here, TEFRA has dramatically reshaped the way information systems staffers view their jobs.

"Before TEFRA, we were information systems people who could have been working in any industry," said Robert McCrory, director of telecommunications services at Samaritan.

"Now, it's critical that we understand the business of health care so we can gear network technology to provide more cost-efficient service," McCrory said.

TEFRA and subsequent legislation capped the rates that health care providers can charge Medicare patients for more than 480 different medical procedures. Soon after TEFRA, major health care insurers adopted the Medicare pricing schedule, forcing hospitals to put a premium on reducing costs.

Cost-cutting efforts

For Samaritan's network staff, this meant finding ways to lower the cost of operating the company's network, which links Samaritan's headquarters to four major Phoenix metropolitan hospitals and 19 community hospitals in Arizona, California and Utah. It also meant using network technology to provide new services to give Samaritan a competitive edge against rival health care providers, McCrory said.

Processors at Samaritan's four metropolitan hospitals are linked to three IBM mainframes at the company's headquarters data center here over a T-1 backbone network.

The backbone network carries IBM Systems Network Architecture data traffic, as well as voice traffic between sites.

For the largest of the four hospitals, the Good Samaritan Regional Medical Center, the company operates a separate fiber-optic line to provide channel-to-channel connections between IBM processors.

At the data center, Samaritan uses a General DataComm, Inc. Megamux T-1 multiplexer, which can automatically reroute traffic around any failed T-1 link. (The hospitals are linked with one another as well as to the data center via T-1 lines.)

The IBM mainframes run IBM's Professional Office System electronic mail software as well as IBM's health care administrative software, called Patient Care Services/Application Development Software (PCS/ADS), McCrory said. PCS/ADS keeps track of admissions, discharge and

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Samaritan looks to net to cut costs

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transfer records, and handles departmental order-entry requests and other administrative tasks for the four Samaritan hospitals.

Outlying hospitals and clinics send batched patient accounting and electronic messages via dial-up lines to IBM mainframes at the data center.

Three of Samaritan's metropolitan hospitals use AT&T Dimension 2000 private branch exchanges. Another hospital and the corporate center use a Northern Telecom SL-1 switch.

In all, Samaritan's network supports 35 locations, about 1,500 IBM-compatible terminals and about 12,000 phone lines.

A plaque hanging in McCrory's office nicknames him "The Gambler" for his leadership and ingenuity two years ago in moving Samaritan's data center from one of its metropolitan hospitals to its present site at corporate headquarters.

As part of that relocation, McCrory upgraded Samaritan's network to its current configuration. The upgrade involved the replacement of 56K bit/sec AT&T Dataphone Digital Service lines with T-1 lines and installing the Megamux to give the network automatic redundancy.

The upgrade has cut Samaritan's network costs by 40% and has protected it against any single point of failure, McCrory said.

Downsizing operations

Also during the data center move, McCrory secured a right-of-way from the city of Phoenix to run fiber from the new data center to Good Samaritan Medical Center. By supporting direct channel attachment to the IBM mainframes, Samaritan was able to downsize its front-end processors and do away with numerous multiplexers, modems and line sets, providing additional cost savings, McCrory said.

It also gives the system subsecond response times as opposed to the two- to four-second response times of systems at Samaritan's other hospitals, he said.

"People could do a lot more with their networks if they weren't afraid," he added. "Of course, you need good people and extensive planning to ensure it works."

McCrory was known for taking bold action well before the data center relocation. Shortly after TEFRA became law and divestiture opened up the communications market, McCrory decided Samaritan would reap huge cost savings if it purchased the AT&T equipment it leased on premises and took over responsibility for its phone and data networks. At the time, Samaritan was paying AT&T $175,000 a month for leased lines and support services, McCrory said.

In 1985, Samaritan purchased AT&T's embedded base of equipment for $2.25 million, a decision that has saved $1.3 million to $1.7 million a year, McCrory said.

Doing very well, thank you

"The reason for our success is that we didn't know what we couldn't do. AT&T said we wouldn't be able to run a network as well as they could. We thought otherwise," McCrory said.

To remain profitable, Samaritan must keep its hospital beds full, McCrory said. To do this, Samaritan is using information technology to improve the quality of patient care as well as to provide doctors with special calling privileges and more convenient access to a wide range of patient information.

Samaritan hopes the services will encourage doctors to refer more of their patients to Samaritan facilities rather than to those of competing hospitals, McCrory said.

Currently, Samaritan offers a paging service for doctors and allows them to access patient data via dial-up lines from personal computers or dumb terminals in their offices. In addition, the hospital allows doctors to hook into its private phone network so they can save money on long-distance calls and calls within Phoenix.

"Health care is a much more competitive environment than it was five years ago. A hospital's bread and butter is patient days, and we have to make it more attractive for patients to come here and for doctors to refer them here," McCrory said.

Room for improvement

Despite its success, Samaritan, like many health care providers with large centralized networks, is struggling to integrate a variety of multivendor systems and departmental applications.

To ensure that its systems can talk with one another, Samaritan set a policy three years ago mandating that all information system purchases must be cleared by Charles Emery Jr., Samaritan's vice-president of information systems. Emery ensures that all new equipment conforms to SNA protocols, McCrory said.

Integrating departmental applications is proving to be much more difficult, but the payoff is potentially greater, said Matthew Denison, director of data administration at Samaritan.

Currently, Samaritan's system maintains separate data bases for each departmental application. But most of this data cannot be integrated in a standard format that upper management or department heads can use to analyze trends in patient care and service or staffing requirements.

Pulling it all together

"We have lots of data that could benefit upper management, but the problem is pulling it all together so it doesn't contradict itself," Denison said.

Denison is planning to implement a relational data base to tie together data from all departmental applications. The relational data base will extract data summaries that upper management can analyze when deciding how to improve Samaritan's patient care and service efficiency, he said. ◻

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THE EXHIBITS: Open Monday, June 12th and Tuesday, June 13th. All the leading vendors in data communications and data networks will be on hand to talk with attendees in a relaxed, informal atmosphere and demonstrate their latest products. This exhibit is not a potpourri of every product available in the telecommunications world but is specialized for data communications people and covering network systems, modems/multiplexers, diagnostic & test equipment, transmission systems & facilities, local area networks and much more.

THE SPEAKERS: Program speakers are all expert users, consultants, panelists or industry technicians. ADCU does not recycle the same speakers carrying the same tired messages over and over again to multiple conferences.

THE SITE: The magnificent Marriott Copley Place Hotel in the fashionable Back Bay area of downtown Boston just four blocks from the Boston Commons and connected by enclosed pedestrian walkway to opulent indoor shopping and world-renowned entertainment. A luxurious hotel with almost 1,200 rooms in a prestigious location!

COMBINED WITH NIU-FORUM MEETINGS: One registration covers all. Attend the ADCU program and exhibits on Monday, Tuesday and Wednesday, June 12-14, and the North American ISDN Users' Forum meetings beginning Tuesday afternoon and continuing all day Wednesday, June 14 to Friday, June 16th. The NIU-Forum is designed to meet the need for a strong user voice in the establishment of ISDN standards and to expedite timely introduction of products and services that meet users' application needs.

THE KEYNOTER: A senior official of renowned reputation in the telecommunication industry. Previous ADCU conference keynoters have been top policymakers and newsmakers who have accurately forecast industry developments and far exceed keynoters at any other telecommunications conference in industry perception.

THE SOCIAL ACTIVITIES: Conference registration fee covers continental breakfasts each day, luncheons on Monday, June 12 and Tuesday, June 13th, a welcoming reception on Sunday, June 11th, the opportunity to talk with your data communications peers at all events, and other social activities being planned.

THE HANDOUT MATERIAL: All attendees will receive copies of most of the presentations, a catalog of all exhibitor names, addresses and products, and a list of all attendees with name, title, company and address.

THE SPOUSES PROGRAM: The Monday, June 12th tour will include all the historic places in the city of Boston and the Tuesday, June 13th tour will be to Plymouth and Cape Cod with scenic rides through other historic towns and a one hour boat cruise. There will be a small additional charge of approximately $40 each day for these tours, payable at the conference.

THE CONFERENCE SPONSOR: The Association of Data Communications Users, Inc. (ADCU), a national user's organization of over 200 member firms, mostly Fortune 1000 companies. ADCU is incorporated in the State of New York with administrative offices in Minnesota and conducts regional and national conferences where members and non-members can increase their skills and seek advice and solutions to their data communications problems.

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Conference fee covers entire conference including NIU-Forum ISDN sessions through Friday, June 16. In the event of cancellation, entire registration fee for the conference will be refunded if notice is received before June 5.

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State Of California, Sun Company, Texaco,Inc., Textron Inc., Travelers In

Tultex Corp., United States Department Of Defense, University Of California

National Bank Of Oregon, Visa International, Williams Telecommunications Services, Inc.

ADVO Systems, Inc., American Airlines, Inc., American International Group, Inc.,

erican Operator Service, Inc., American Savings & Loan Association, AMOCO, Automobile

outhern California, Bear Stearns & Co., Inc., Bell Helicopter, Boeing Computer

Bristol Meyers, Caldor, Carter Hawley Hale Stores, Inc., Com/Energy

mercial Union Insurance Company, Continental Illinois National

on Systems, Inc., E.I. Du Pont De Nemours & Co., Inc., Empire

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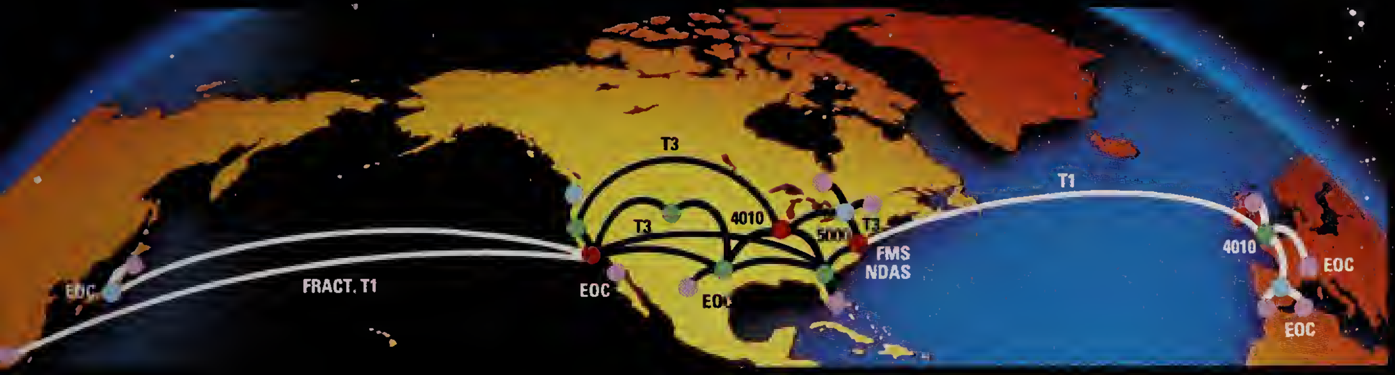
Here's what will keep our clients a step ahea



It's how we put a private network together that sets our clients apart. We offer the most complete range of products and services designed to offer *total*, integrated solutions that meet our clients' unique needs. Now, we deliver an even wider world of opportunities, including:

- The capability to fully utilize high-speed transmission lines, including T3
- Cost efficient connectivity to smaller sites
- Additional connectivity to international sites, local area networks, and multivendor communications equipment
- An expanded domain of network management, with an increased ability to leverage existing staff and resources
- An expert diagnostic service and an expert T-span service which designates N.E.T. as the client's representative to the carrier, and gives N.E.T. full responsibility for maintaining the network.

Expertise PLUS:
The ability to control and manage increasing complexity more effectively.

N.E.T.'s n

Transmission PLUS:
The ability to take advantage of new bandwidth offerings, from fractional T1 to T3.

IDNX/90 Transmission Resource Manager

N.E.T. augments its family of Transmission d:

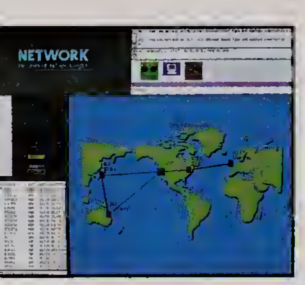
Connectivity PLUS: The ability to integrate and support a wider number of applications.

◆ Indicates new for 1989

◆ LanExchange/50

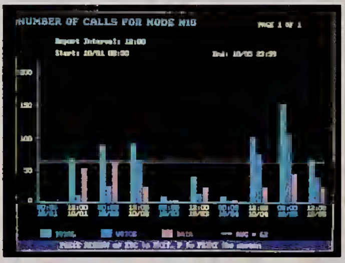
◆ PacketPlus™/50 X.25 Switch.

N.E.T.'s new connectivity tools provide clients with full LAN/WA

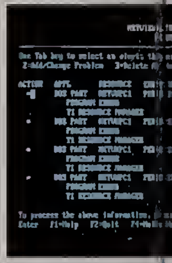


◆ Series 5000 Network Management System

Network Design and Analysis System



Model 3040, Model 3050 Enhanced Operator Console



Model
NetVi

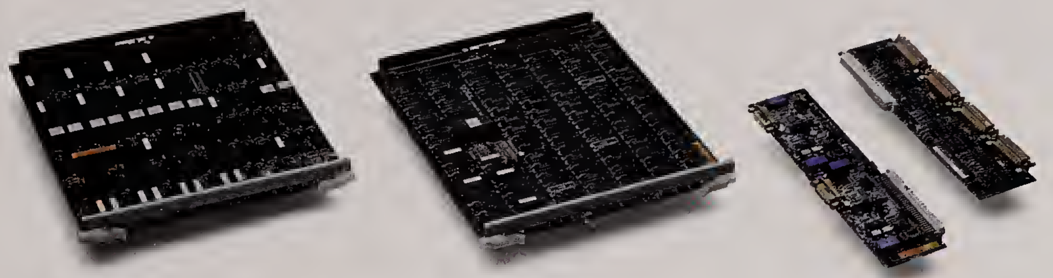
w expertise offerings include an expert diagnostic service that gives client staff greater contr

● IDNX/70 Transmission Resource Manager

IDNX/70T TEMPEST Transmission Resource Manager

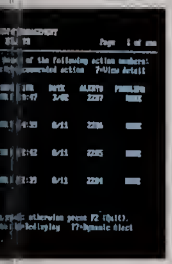
Resource Managers (TRMs) to meet bandwidth requirements at all network locations, from lo

◆ SPX/SI Software Interface
For VMS Hosts.



◆ International Standard Interfaces

integration, X.25 connectivity, and wide area solutions for DEC hosts. An expanded number o



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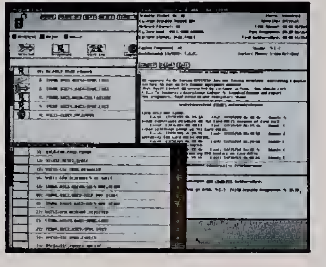
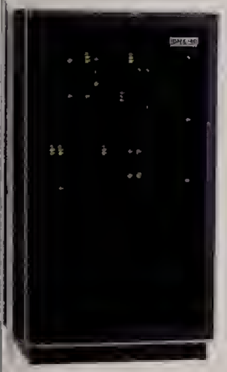


◆ Expert
Fault Management
Service

Technical Assistance
Center (TAC),
◆ TAC International (UK)

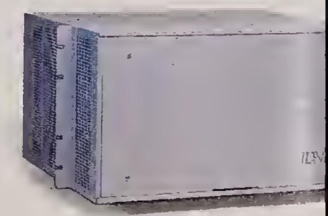
◆ Expert T-span
Service

and problem solving capabilities than ever before. In addition, our TAC group can now interf



IDNX/40 Transmission
Resource Manager

IDNX/20 Transmission
Resource Manager



-traffic sites to the highest-traffic sites, from corporations requiring proven reliability to gover

SPX Data Network Processor

IDNX Data/Voice Modules

f interfaces enable integration of even more international networks.

Field Service
Support

Systems Integration
Group (SIG)

Training and
Education

ace with the carrier for you, taking full responsibility for maintaining your network.

IDNX/10 Integrated
Access Multiplexer

IDNX Internodal Trunking Support

ment agencies demanding the highest survivability.

Here's what put N.E.T. clients ahead:

By building an N.E.T. private network, clients have achieved:

- Integration of voice, data and image networks on a single "backbone" network
- Centralized communications control
- New standards of reliability and applications availability
- Flexibility to add applications and take advantage of technological advances faster than ever
- A payback average of just twelve months

Expertise: The ability to run, maintain and grow the network to maximum advantage.

Model 4010 Network Management System

Our workstation-based Assistance Center (TAC), powerful networking

Transmission: The ability to pack more communications on wholesale bandwidth for greater control, lower costs.

IDNX/70 Transmission Resource Manager

IDNX/70T TEMPEST Transmission Resource Manager

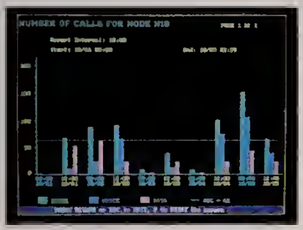
Clients consolidate more communications on fewer lines with N.E.T.'s family of

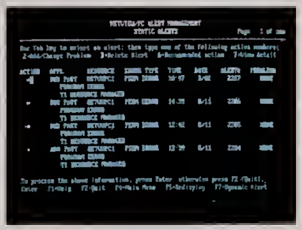
Connectivity:
The ability to be
compatible with
different protocols
and standards for
wider integration.

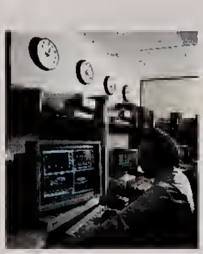
SPX™ Data Network Processor

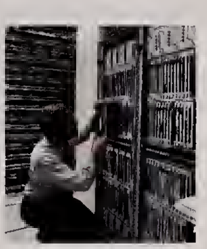
IDNX Data/Voice Modules

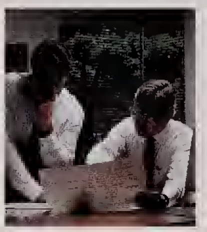
Our tools enable clients to integrate existing multivendor equipment, add new sites and applications onto the network quickly and economically, and access public network services and international networks.


Model 3040,
Model 3050 Enhanced
Operator Console


Model 3210 NetView
Interface


Technical
Assistance
Center (TAC)


Field Service
Support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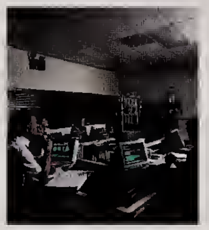
Training
and Education

management tools offer clear, complete visibility of the network. Service offerings like our 24-hour-a-day Technical Systems Integration Group (SIG), Field Service personnel, and Training assure that our clients achieve the most advantages.

IDNX/40 Transmission
Resource Manager

IDNX/20 Transmission
Resource Manager

IDNX Internodal Trunking Support

IDNX® Transmission Resource Managers (TRMs), the primary building blocks of private networks.

Look to N.E.T. for the next step.

Now that you've gotten a glimpse of what N.E.T. is doing for its clients today, consider for a moment what N.E.T. can do for you—now, and in the years to come. Consider...

- ☐ Voice and data communications systems rated the world's best*
- ☐ Comprehensive support from the most experienced networking experts in the industry
- ☐ Solutions tailored to your specific needs—now, and as your network grows and changes
- ☐ The most enviable track record in the business.

As a client of N.E.T., you'll continue to solve network problems and gain substantial benefits a step ahead of your competition.

Bandwidth
Step

*Fortune Magazine, March 28, 1988.

Transmission PLUS

Our IDNX transmission resource managers have defined the industry for the past several years, with performance that competitors continue to be measured by today. Our new T3 and fractional T1 access will further increase client transmission capabilities in the years ahead.

Network Management Step

Expertise PLUS

N.E.T.'s management tools equip managers and planners with the most important information available for short-term and long-term decisions. The advantage N.E.T. offers you today and in the future is this: Extending control over more applications and equipment over broader geographical areas. And simplifying network management so that network staff can do more than ever before.

Internetworking Step

Connectivity PLUS

Our new offerings such as LAN/WAN, X.25, DEC®, and international network connectivity applications, enable clients to integrate islands of networks and equipment into a single, highly efficient network. The result is an expanded applications platform to leverage for greater competitive advantage.

The Next Step

Information PLUS

Our clients live in a world of constant change. Because of this, N.E.T. believes the networks of the 1990's will need to transport *information*, not just bits. They will have to connect *applications*, not just physical interfaces. To accomplish this, N.E.T. TRMs will use new technology to provide *Information Resource Management*. For, as the boundaries between networks and applications continue to fade, the network itself becomes the application.

NETWORK
EQUIPMENT TECHNOLOGIES ™

A step ahead

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Hotline: ***1-800-952-6300,***
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PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

Worth Noting

See inside for:

- Cisco Systems' four-port serial communications board that links routers at speeds up to 4M bit/sec
- Network Systems' boards connecting DEC VAXes to Hyperchannel net
- Online Computer Systems' software supporting local net CD-ROM access

First Look

Interlan enhances its Lan Detector

Interlan, Inc. recently enhanced its Lan Detector Ethernet protocol analyzer to support analysis of Banyan Systems, Inc. VINES and Apple Computer, Inc. AppleTalk protocols.

The **Lan Detector Version 2** software uses Interlan's NP600A Ethernet interface board and runs on an IBM Personal Computer AT or compatible. The new version also supports extended memory boards, including Intel Corp.'s Above Board and AST Research, Inc.'s Rampage, that increase the amount of random-access memory on the Personal Computer AT. With that increased RAM, Lan Detector can store more protocol frames in a buffer.

The Personal Computer AT is attached to an Ethernet local network as a node via an external transceiver or a self-contained transceiver. Lan Detector captures network frames as they travel over the network and provides real-time monitoring and network traffic displays.

Users can set parameters that instruct Lan Detector software to capture only certain frames in a buffer. Those frames can then be used to diagnose any protocol problems.

In addition to VINES and AppleTalk, Lan Detector is capable of analyzing Open System Interconnection, Digital Equipment Corp.'s DECnet, Transmission Control Protocol/Internet Protocol, Novell,

(continued on page 27)

Tandem ties OLTP into 3 architectures

By Susan Breidenbach
West Coast Bureau Chief

CUPERTINO, Calif. — Tandem Computers, Inc. recently announced a series of products that will enable users to integrate the company's minicomputer on-line transaction processing (OLTP) systems into SNA, OSI and TCP/IP net environments.

SNAX/Cross Domain Facility (CDF) is a hardware/software package that makes a Tandem OLTP system appear as an IBM host in a Systems Network Architecture network. Users in the network can gain direct access to Tandem applications.

Tandem applications can also communicate with applications running on IBM hosts. For example, a banking transaction on a Tandem OLTP system might access information on a host or trigger a host update.

The product includes a high-level 3270 interface that lets the Tandem system communicate with 3270 terminals and printers, as well as with a low-level logical unit interface that supports all of IBM's logical units. Cross-domain sessions can also be established between the Tandem system and a variety of devices that are channel-attached to other SNA hosts on the network.

Tandem OSI/AS adds Tandem OLTP system compatibility to the session layer, or Level 5, of the International Standards Organization's seven-layer Open Systems Interconnection model. This enables a Tandem application to communicate with applications running on other vendors' systems that support OSI session-layer services.

Similarly, Tandem TCP/IP lets Tandem systems communicate with other hosts supporting the Transmission Control Protocol/Internet Protocol in Ethernet environments. The product includes the Berkeley Unix 4.3 Sockets interface, which programmers can use to create distributed applications.

Tandem also offered an enhancement to its Expand software, which links multiple Tandem OLTP computers via a mix of local- and wide-area connections into a single computing environment. A user at a terminal attached to one of the hosts sees all of them as a single system. The enhancement, called Expand/LAN, extends this single-system image to users who access the Tandem hosts over an Ethernet.

Tandem said the products will be available in the third quarter of 1989. License fees start at $3,500 for SNAX/CDF, $2,475 for Tandem OSI/AS and $4,000 for Tandem TCP/IP. Expand/LAN will be available free to licensed users of Tandem's Expand product. Tandem can be contacted by writing to 19333 Vallco Pkwy., Cupertino, Calif. 95014, or by calling (408) 725-6000.

Multi-Tech launches foray into V.42 modem market

Initial offering supports LAP M, error checking.

By Jim Brown
New Products Editor

MOUNDS VIEW, Minn. — Multi-Tech Systems, Inc. last week introduced a CCITT V.42-compatible modem, one of the few that have been announced since the standard was adopted almost a year ago.

The new MultiModem 224EH7, an upgraded version of the 224E, is a dial-up modem that operates at 2,400 bit/sec and, in accordance with V.42, supports both the CCITT Link Access Procedure (LAP) M and Microcom, Inc.'s Microcom Network Protocol (MNP) Class 4 error-checking techniques. Multi-Tech Systems also added support for the CCITT V.25bis autodialing standard to the MultiModem 224EH7.

Besides error correction, the V.42 standard, a standard for dial-up modems transmitting asynchronous data synchronously, will eventually be enhanced to support data compression. The compression standard will likely be defined under LAP M but could be based on existing compression techniques included in the higher levels of the MNP protocol.

By supporting MNP Class 5 and MNP Class 7 data compression techniques, MultiModem 224EH7 enables users to take advantage of MNP data compression before the V.42 standard is set.

MNP Class 5 uses a compression algorithm that replaces repetitive bit streams with shortened codes. This technique enables the modem to achieve an effective throughput of 4.8K bit/sec under optimal conditions.

MNP Class 7 data compression is an enhancement over Class 5 and enables the MultiModem 224EH7 to achieve 7.2K bit/sec under optimal conditions.

(continued on page 26)

Products run 3 LAN types on twisted pair

New Nevada Western wares use unshielded wire for Ethernet, token-ring, AppleTalk local nets.

By Jim Brown
New Products Editor

CHICAGO — Nevada Western, Inc. introduced at Comdex/Spring '89 here last week a series of products that enable Ethernet, token-ring and Apple Computer, Inc. AppleTalk networks to be implemented using unshielded twisted-pair wire.

Nevada Western said its products support the physical layer of the seven-layer Open Systems Interconnection model and can be used with any network operating system. Each of the products works with Nevada Western's proprietary wiring scheme as well as with AT&T's Premises Distribution System.

The company's NEV*LAN10 supports the IEEE 802.3 Ethernet standard and the IEEE 802.3 10BaseT draft standard for the physical layer. 10BaseT is the standard for unshielded twisted-pair Ethernet.

NEV*LAN10 includes a stand-alone Ethernet transceiver, a patch panel and an Ethernet hub that can support as many as 12 users.

The transceiver links the coaxial cable microcomputer Ethernet interfaces to an unshielded twisted-pair wire that is plugged into an RJ-11 or RJ-45 wall jack.

NEV*LAN10 supports 10M bit/sec Ethernet transmission over twisted-pair wire up to 330 feet from the wiring closet. At the wiring closet, the twisted-pair wire terminates in a modular distribution panel that supports as many as 96 RJ-11 or RJ-45 jacks.

By connecting a twisted-pair wire from each office to a numbered jack port, the distribution panel enables users to quickly determine the office location from which a twisted-pair wire originated.

The company's NEV*LAN10 supports the IEEE 802.3 Ethernet standard.

▲▲▲

The NEV*LAN10 panel is connected via a 50-pin connector to a NEV*LAN10 Ethernet hub. The hub acts as a cross-connect unit, establishing connections between NEV*LAN10-attached devices.

Each NEV*LAN10 panel also includes an RJ-11 or RJ-45 diagnostic port as well as a network port. The diagnostic port supports attachment of a breakout box used to detect wiring problems. The network port can be used to link a NEV*LAN10 panel to another panel. As many as 13 panels can be linked to support a total of up to 144 users.

NEV*LAN4 supports the physical layer IEEE 802.5 standard 4M bit/sec token-ring nets.

▲▲▲

Additionally, NEV*LAN10 Ethernet hubs include a built-in interface for coaxial cable Ethernets. This enables users on one NEV*LAN10 Ethernet to communicate with users on another NEV*LAN10 net.

NEV*LAN10 hubs also include a built-in RS-232 diagnostic port that supports a Digital Equipment Corp. VT-100 terminal or an IBM Personal Computer emulating a VT-100. That terminal can be used to monitor hub operation and collect network performance statistics stored on the hub.

NEV*LAN10 transceivers cost $149 each, and each hub unit and panel supporting 12 users costs $2,995. NEV*LAN10 products are scheduled to ship in June.

Token ring at 4M

Nevada Western's NEV*LAN4 supports the physical layer IEEE 802.5 standard for token-ring networks operating at 4M bit/sec. NEV*LAN4 includes a stand-alone media filter unit and a 16-port multiple-station access unit (MAU).

The media filter links the microcomputer's shielded twisted-pair wire token-ring interface to an unshielded twisted-pair wire that is plugged into an RJ-11 or RJ-45 wall jack. From the jack, token-ring signals are transmitted over unshielded twisted pair to a NEV*LAN4 MAU in a wiring closet up to 330 feet away.

MAUs support cross-connection functions for attached de-

(continued on page 26)

Retix software package supports OSI's Virtual Terminal Protocol

By Jim Brown
New Products Editor

SANTA MONICA, Calif. — Retix recently announced software that supports the Virtual Terminal Protocol (VTP) specified in the Open Systems Interconnection model.

Written in C language, Retix's VTP software operates at the application layer of the seven-layer OSI model. The VTP software will enable vendors and large end users to write microcomputer applications capable of accessing disparate systems using a standard terminal protocol.

The VTP specification requires software on both the microcomputer and the target host. It will enable a microcomputer user to access an IBM mainframe as a 3270 terminal by using microcomputer-resident VTP software to establish a terminal-emulation session with the host. The host-resident VTP software will then convert the standard terminal protocol to an IBM 3278 terminal session.

That same microcomputer can also establish a VTP session with Digital Equipment Corp. VAX-resident VTP software that converts the protocol to a VT-100 terminal protocol. Previously, the microcomputer had to run both a 3270 and VT-100 terminal-emulation program to connect to the IBM or DEC host.

Retix's VTP software supports the VTP implementation defined in Version 3.0 of the Technical and Office Protocol and completes its TOP-based protocol. The software also conforms to the International Standards Organization's 9040 service definition and the 9041 protocol specifications for virtual terminal applications.

Retix will release three versions of the software over the next few months. The first is a portable version that can be tailored to run under any host computer operating system. This package will be licensed to software vendors and large end users starting in the second quarter, and it will include Retix's VTP source code, documentation and instructions for porting the software to various operating systems.

The portable version will enable software vendors and large end users to build host-based applications that convert VTP to the specific terminal protocol used by that host. The license fee will be determined jointly by Retix and the software vendor or end user.

Retix will also sell a DOS-based version and a Unix System V Release 3-based version of the software. These versions will run on microcomputers and will enable users to create VTP sessions with any host on an OSI- or TOP-based net. Both versions are scheduled to be available in the fourth quarter; prices have not yet been set.

Retix can be contacted at 2644 30th St., Santa Monica, Calif. 90405, or call (800) 255-2333 or (213) 399-2200.

Products run 3 LAN types on twisted pair

continued from page 25

vices, and one of the MAU ports can be used to connect to other MAUs, enabling users attached to different MAUs to communicate. As many as five NEV*LAN4 MAUs can be connected to build a NEV*LAN4 network supporting 75 users.

The NEV*LAN4 media filter costs $39, and the NEV*LAN4 MAU supporting 16 users is priced at $995. Both products are scheduled to ship in July.

Apple LAN product

The company's MAC*LAN products support the physical layer of Apple's AppleTalk and LocalTalk networks that operate at 230K bit/sec. MAC*LAN includes a balun that connects the shielded twisted-pair AppleTalk port on a Macintosh to an RJ-11 or RJ-45 unshielded twisted-pair wall jack.

At the wiring closet, customers can use a Nevada Western eight-port or 16-port MAC*LAN patch panel that supports cross-connection functions. In addition, MAC*LAN works with Farallon Computing, Inc.'s 48-port patch panel, which can also act as a cross-connection device.

The total amount of twisted-pair wire from each device to the wiring closet in a MAC*LAN net cannot exceed 4,000 feet.

The MAC*LAN balun is priced at $39, and an eight-port MAC*LAN patch panel costs $299. MAC*LAN is scheduled to ship in June.

For more information, users can contact Nevada Western in writing at 615 N. Tasman Drive, Sunnyvale, Calif. 94089, or by calling (408) 734-2700.

Multi-Tech launches foray into V.42

continued from page 25

The CCITT V.25bis standard defines autodialing for asynchronous or synchronous data communications. When operating in synchronous mode, V.25bis supports IBM's Binary Synchronous Communications and Synchronous Data Link Control protocols and will redial busy lines or lines that are not answered after a specified number of rings.

The modem also supports the CCITT V.22 and V.22bis standards, as well as Bell 212A and 103 standards.

The stand-alone MultiModem 224EH7 is priced at $649.

Multi-Tech Systems can be reached at 2205 Woodale Drive, Mounds View, Minn. 55112, or call (800) 328-9717 or (612) 785-3500.

I'm not just providing customer support.
OPEN STATUS

First Look

continued from page 25

Inc.'s NetWare, Xerox Corp.'s Xerox Network Systems, and Sun Microsystems, Inc.'s PC-Network File System protocols.

The Lan Detector is sold with complete documentation and a diagnostic diskette. Its list price ranges from $10,000 to $15,500, depending on protocol selection.

Interlan, Inc., 155 Swanson Road, Boxborough, Mass. 01719, or call (508) 263-9929.

Cisco Systems unveils board to link its routers at 4M bit/sec

Cisco Systems, Inc. recently introduced a four-port serial communications board that provides links between routers at speeds up to 4M bit/sec.

The **Serial Communications Interface (SCI)** board supports up to four communications ports, each of which is capable of providing connections to synchronous wide-area network lines or providing a dedicated circuit between local routers.

The board supports connections to public or private X.25 data networks supporting the High-Level Data Link Control, Link Access Procedure B, X.25 or Defense Data Network (DDN) 1822-J protocols.

The SCI board resides in cisco's nine-slot A-size or four-slot M-size router chassis. When used in the A-size chassis, the board enables users to configure an internetwork gateway supporting up to 20 T-1 circuits. The SCI board is cisco's fourth communications board. The others include the Multi-port Communications Interface, the Token Ring Interface and the DDN 1822 LH/DH interface boards.

In conjunction with the Multi-port Communications Interface board, the SCI board can be used as a controller for a serial link bridging two remote Ethernets.

The new board also supports the internetwork routing specifications defined in Layer 3 of the Open Systems Interconnection model and is capable of bridging nets that use different physical link layers.

Cisco's SCI board comes in three versions: a board with four high-speed synchronous serial ports operating at up to 4M bit/sec is priced at $7,100; a board with four low-speed ports operating at up to 64K bit/sec costs $3,800; and a board with two high-speed ports operating at up 4M bit/sec and two low-speed ports operating at up to 64K bit/sec is priced at $6,200.

Cisco Systems, Inc., 1360 Willow Road, Menlo Park, Calif. 94025, or call (415) 326-1914.

Network Systems offers boards linking VAX minis to Hyperchannel

Network Systems Corp. recently introduced three new network interface boards that connect Digital Equipment Corp. VAX 6000 and VAX 8000 series minicomputers to Network Systems' Hyperchannel net.

The **PI 218, PI 418** and **PI 419** interface boards reside in VAXes supporting the DEC VAXBI bus. The boards act as gateways connecting the VAX to the Hyperchannel network.

Hyperchannel nets provide local- and wide-area connections between disparate host computers using Network Systems' Network Executive (NETEX) or Transmission Control Protocol/Internet Protocol software. Currently, Network Systems sells gateways that link Hyperchannel with computer systems from more than 40 vendors, including Apollo Computer, Inc., Sun Microsystems, Inc., IBM, Hewlett-Packard Co. and Cray Research, Inc.

The PI 218 board contains a NETEX coprocessor, which encapsulates VAX data in NETEX-based packets that are transmitted across Hyperchannel. This frees up processing power on the VAX hosts.

The PI 418 and PI 419, on the other hand, support protocol processing in the host. The two boards support both TCP/IP and NETEX protocols over Network Systems' Hyperchannel-DX networks. The PI 419, which uses a Motorola Corp. 68020 processor, can support data-transfer rates over Hyperchannel-DX networks at speeds up to 150M bit/sec. The PI 418 uses a Motorola 68010 processor and runs at lower speeds.

The two boards also support Hyperchannel-50 networks, which run at 50M bit/sec, and Hyperchannel-10 networks, which run at 10M bit/sec.

The PI 218 is priced at $5,000, the PI 418 costs $4,000, and the PI 419 costs $6,950. All of the products are available now.

Network Systems Corp., 7600 Boone Ave. N., Minneapolis, Minn. 55428, or call (612) 424-4888.

Online enhances net software to control access to optical disks

Online Computer Systems, Inc. recently enhanced its networking software that enables users to access local net-attached CDROM disk drives.

The new version of **Opti-Net** enables up to 100 users to access CDROM disk drives attached to as many as nine local net-based optical servers, which are existing file servers running Opti-Net. Previous versions supported only 32 users and one optical server per local net.

The IBM Network Basic I/O System-compatible package includes server software that resides on an optical server and controls access to as many as 32 CDROM drives. Personal computer-resident client software is used to link local net-attached personal computers to optical servers.

The software can be licensed for $795 for as many as eight users and for $1,495 for up to 100 users. It is available now.

Online Computer Systems, Inc., 20251 Century Blvd., Germantown, Md., 20874, or call (301) 428-3700.

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"ISDN will allow us to get rid of our network spaghetti and concentrate on selling hamburgers."

McDonald's faced a challenge. They were spending too much time and resources maintaining 21 different communications networks, rather than on what they do best: selling hamburgers.

And McDonald's is growing at the rate of one new restaurant every 17 hours.

As Bonnie Kos, McDonald's V.P. for facilities and systems, put it, "We had to adapt a single approach to all our communications that not only got rid of all our network spaghetti, but allowed us easy connectivity and communications between computers that use different protocols."

The approach they chose was ISDN.

Ameritech's Illinois Bell, in conjunction with AT&T Network Systems, and using a 5ESS® switch, used ISDN to allow McDonald's to migrate to a single, integrated, all-digital network.

So now, McDonald's sends integrated voice and data over an ordinary telephone line. Turning every work station into an information center, while minimizing costs and gaining greater network control.

But, the advantages of ISDN go beyond simplifying and connecting McDonald's communications network.

ISDN will soon allow the company to access more current market data, quickly track product promotions, streamline inventory control and reduce administration workloads. All this means more time to spend one-on-one with the most important part of McDonald's business—the customer.

Even now, McDonald's is using such advanced ISDN features as calling number identification, electronic directory, and high-speed, high-quality facsimile transmission without dedicated lines.

As Bonnie Kos summed it up, "ISDN is letting us do a lot more with a lot less."

The Future's on the Line.

At AT&T, we believe that's where the future lies for every company—doing more with less. ISDN helps accomplish that today and helps pave the path to a larger vision: Universal Information Services—a world of services available on demand.

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OPINIONS

REGULATION

BY CHARLES JOHNSON

Price caps to help AT&T, hurt the industry

Judging from the structure of the Federal Communications Commission's price cap plan, price caps will be good for AT&T but will not change the industry for the better, as was stated in *Network World's* recent editorial ("Price caps will change the industry for the better," *NW,* April 3).

Instead of controlling price changes for each rate element of a service, as the FCC had been proposing for the past two years, the commission adopted a scheme that applies price banding limitations to entire groups of services. AT&T can now manipulate pricing for its private-line services and customer premises equipment in ways that can greatly inflate the cost of private networking. Since AT&T virtually owns the market for terrestrial private-line services, it now not only has the incentive but also the opportunity to skew rates in its favor.

Users might find themselves seesawing between analog and Dataphone Digital Service in response to AT&T's "strategic" pricing, making it hard to fully recover hardware investment costs. And uncertainty about future service pricing would make it all but impossible to plan networks precisely.

Several years ago, AT&T structured Dataphone Digital Service tariffs so that it could overcharge for services in the higher speed market, in which it enjoyed a virtual monopoly, and undercharge for services in the lower speed market, in which it faced competition from analog voice-grade service providers and modem vendors. But the FCC ruled that such tariffs were unlawful and had an anticompetitive impact on modem and multiplexer manufacturers. Now, under price caps, AT&T has a license to engage in price manipulation to cripple competitors and stifle innovation.

AT&T's manufacturing arm will know which products to develop well in advance of any AT&T rate changes, thereby securing a competitive edge. But without competition, AT&T will have no incentive to keep prices down and provide what users want. In addition, users cannot count on other carriers to keep service rates down since they typically price their services just enough to undercut AT&T.

Switched services and switched private-line services should not be in a basket with business transport services. The service categories should be analog voice-grade and below; subrate Dataphone Digital Service (2,400, 4.8K and 9.6K bit/sec); 56K bit/sec Dataphone Digital Service; and T-1, T-3 and fractional T-1. These transport services should be put into separate baskets: one for DS0 and under and another for high-capacity services. Such measures would closely align the services in a basket with the type of customer premises equipment used with those services, preventing AT&T from using its newfound pricing flexibility to unfairly leverage its position in competitive equipment markets to the ultimate detriment of users.

To further limit AT&T's ability to manipulate rates and monopolize customer premises equipment markets at users' expense, the upper band limit for each service category should be reduced from 5% to 2%. AT&T had objected to rate-element price banding as being too burdensome. Yet it recently submitted a tariff on Federal Telecommunications System (FTS) 2000 of almost 2,000 pages, which priced out 19,000 separate routes. Requiring price banding by rate elements, then, is really manageable by AT&T and should be retained as the cornerstone in any price cap plan.

Later this month, when the FCC issues its order on price caps, users will be able to voice objections and ask for changes by petitioning for reconsideration. Once price caps go into effect on July 1, users will carry the burden of proving that rates are properly cost-based. Regulatory and judicial processes typically move at a snail's pace; corrective measures could take years.

Johnson is chairman and chief executive officer of General DataComm Industries, Inc. in Middlebury, Conn.

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EDITORIAL

IBM owes users opportunity for token-ring interoperability

Ever since the formation of the Open Token Foundation (OTF) last fall, IBM has said it supports interoperability of token-ring interfaces.

Balderdash!

IBM's actions to date suggest otherwise. The company won't fully open the specifications to its Token-Ring Network. And this past February, IBM refused an invitation to join OTF because it decided the group had an ulterior motive: to get IBM to lay out its implementation of the token-ring spec.

What's so bad about that? IBM's token-ring interface, and other vendors' too, should conform to a single interpretation of how to implement the IEEE 802.5 spec — meaning IBM, and others, should offer token-ring boards that can be swapped in and out of various networks. A token-ring board should be the welcome mat into a network, not a locked door.

Vendors' local network operating systems should provide the added value that distinguishes one token-ring network from another.

Users would have gladly welcomed interoperable token-ring boards a year ago, when IBM, which never acknowledged a shortage, couldn't meet demand for token-ring interfaces. Some users were forced to wait weeks — even months — for boards. With interoperable token-ring boards, users could have bought third-party products to satisfy their needs.

In recent weeks, some token-ring suppliers have been serving up cut-rate token-ring interfaces at more than 50% off the regular prices. Some users say they may purchase these products but are wary about whether they'll work in IBM networks.

"There's a distinct possibility we'll buy cheaper token-ring cards from third-party vendors so long as they interoperate with our IBM equipment," says Suzanne James, a communications manager at PepsiCo, Inc.'s Peekskill, N.Y., offices.

> A token-ring board should be the welcome mat into a network, not a locked door.
>
> ▲▲▲

IBM has a chance to open up its local network. Instead, it is standing pat, claiming that the programming interfaces into the IBM Token-Ring Network are proprietary.

Sure, IBM makes the interfaces available, but that doesn't make them open if a third-party supplier has to reverse-engineer the technology.

IBM makes other programming interfaces available to third parties too. The company is pushing hard to get software developers to write to its Advanced Program-to-Program Communications interface, and third parties have already developed gateways to let non-IBM systems communicate with IBM nets using APPC.

Other IBM application program interfaces such as the Common Programming Interface — Communications, a vital communications component of Systems Application Architecture, are also open to third-party development.

Clearly, IBM is protecting its installed base. According to International Data Corp. in Framingham, Mass., IBM sells 80% of all token-ring interfaces in the U.S. Because it owns a majority of the market, IBM dictates interoperability.

The company has increased its lead by testing its boards' operability only in IBM nets, not in other vendors' token rings.

Yet token-ring interoperability consists of more than just IBM offerings. Users should be able to buy a token-ring board that works not just in an IBM local network, but in any other vendor's token-ring.

Users need more than just a single specification for token-ring interoperability; they need a single interpretation of that specification. IBM should step forward and offer to conduct mutual testing with OTF members to guarantee users interoperability.

Anything less would be unfair to users.

TARIFFS

BY ALAN PEARCE

It's too early to give AT&T regulatory relief

Recently, AT&T has been bombarding the Federal Communications Commission with what observers have called imaginative, innovative, yet probably unlawful prices for a wide array of service offerings, ranging from Tariff 12 customer-designed integrated services to Tariff 15 competitive pricing plans. In January, the company requested, almost demanded, that the FCC keep secret certain Tariff 16 details related to its Federal Telecommunications System (FTS) 2000 contract.

In February, AT&T Chairman and Chief Executive Officer Robert Allen urged Washington, D.C. policymakers to apply minimal regulation to his company, claiming it is no longer a dominant long-haul carrier.

Finally, AT&T lobbyists insisted that the company be given price caps to replace the traditional rate-based regulation. Price caps will supposedly peg AT&T service rates to the consumer price index, minus a complex productivity factor, and then permit the company to earn whatever profits it can squeeze out of the telecommunications industry.

When the Bell System was split up by the Modified Final Judgment in 1984, AT&T believed that deregulation would be handed to it on a silver platter, so to speak. It had no such luck, however, mainly because the Reagan administration failed to live up to its deregulatory promises. Now, AT&T apparently believes the regulatory pendulum is swinging in the opposite direction and that it must take advantage of the Reagan-to-Bush transitionary disarray to score some long-promised but elusive gains.

Over the past several years, AT&T has been preparing to reassert itself as a telecommunications-information industry giant. It has slashed its work force, taken multibillion-dollar write-downs and made marginal-to-slender profits. These strategies have persuaded at least some sympathetic policymakers that the company should be given a deregulatory break.

But, although AT&T appears to have won the price cap battle, this may be its only victory. Unfortunately for AT&T, time may not be running out; it may have run out already.

For a start, the company *is* dominant, with about a 70% share of the long-haul market. This market share could increase if AT&T continues to slash its prices and win back customers from its major competitors, MCI Communications Corp. and US Sprint Communications Co., which have less than 25% of the market between them.

> Although AT&T appears to have won the price cap battle, this may be its only victory.
>
> ▲▲▲

Also, because of its write-downs, labor cutbacks and changes in contractual obligations with its former local telephone companies, AT&T is expected to declare huge profits over the next several years.

This is why AT&T had to be awarded price caps *now*; otherwise, the FCC would have been forced to order the company to rebate excess revenues to its users and slash prices still further, thus making it more — not less — competitive with its rivals. AT&T also appears to have a major regulatory and legislative problem regarding its prices for telecommunications services. This is why Allen is vigorously arguing for an FCC or congressional declaration that AT&T is a nondominant carrier. Nondominant carriers don't need to file tariffs or seek specific FCC authority to begin or terminate services.

It is, however, extremely unlikely that the FCC could bestow nondominant carrier status on AT&T even if it wanted to. The Communications Act of 1934 places somewhat onerous restrictions on the pricing and profit-making ability of common carriers such as AT&T.

For instance, Title II of the act says that "all charges . . . shall be just and reasonable." Those that are "unjust and unreasonable" will be "declared to be unlawful." Another problem for AT&T is language in the act stating that it must "file with the commission and print and keep open for public inspection schedules showing all charges for itself and its connecting carriers." This is why AT&T is being ordered to reveal all in its FTS 2000 tariff.

These responsibilities of AT&T are further explained in Part 61 of the FCC rules relating to tariffs. The FCC says that there are eight attributes of a sound rate structure, for example, an AT&T tariff:

- Simplicity, public acceptability and feasibility of application.
- Freedom from controversy regarding proper interpretation.
- Effectiveness in yielding the total revenue requirement under the fair rate-of-return standard.
- Revenue stability over the longer term.
- Stability of the rates themselves, with a minimum of unexpected and dramatic changes.
- Fairness of the rates, especially in the way that costs are apportioned among different classes of consumers.
- Avoidance of undue discrimination in rate relationships.
- Efficiency of the rates in discouraging wasteful use of the service while promoting all justified types and amounts of use.

Clearly, AT&T is in a regulatory straitjacket, and that explains Allen's cry for mercy from federal policymakers. As long as AT&T is regulated, the FCC will continue to harass it concerning tariffs for its service offerings. In addition, its competitors, users and the equipment manufacturers that compete with AT&T's equipment manufacturing company will call for more stringent, not relaxed, regulation of AT&T.

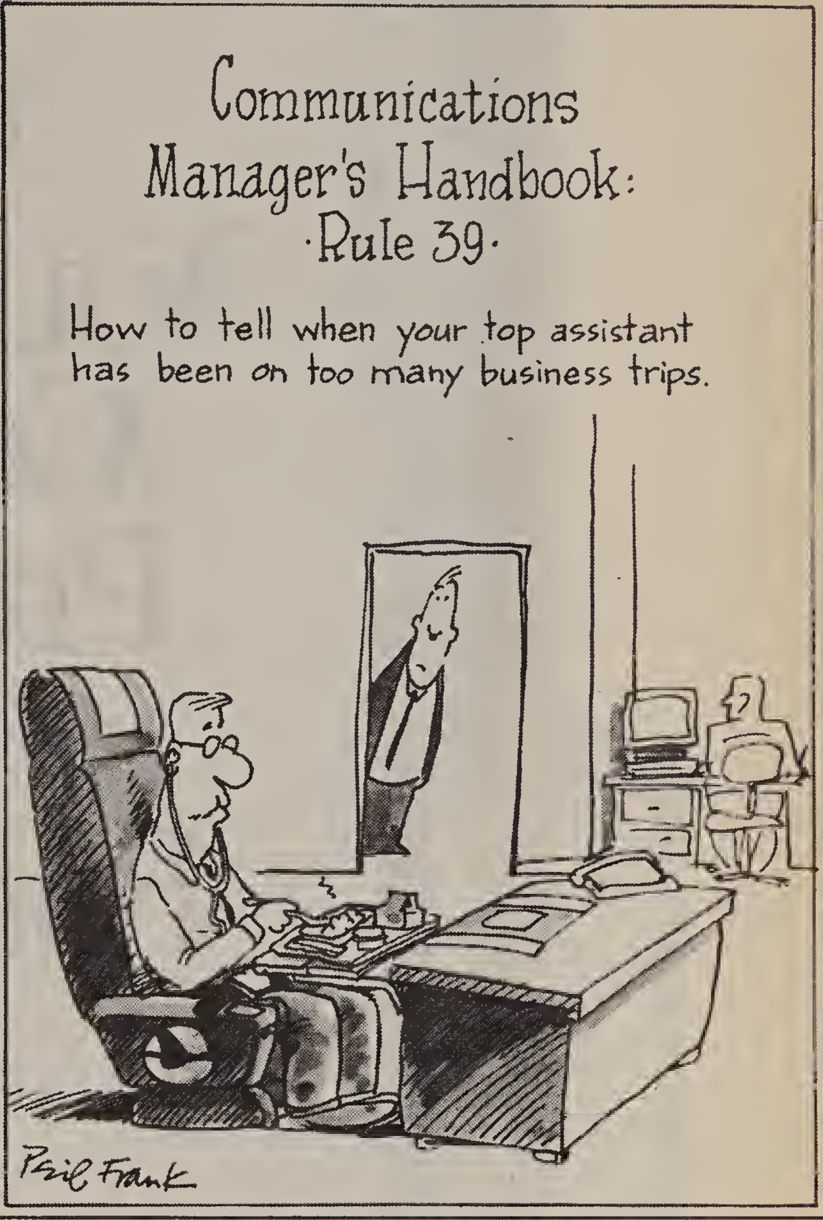
This is appropriate, not only because it is the law but because AT&T is dominant in a business that is only now becoming competitive after years of AT&T monopoly in three areas: local service, long-haul service and equipment.

It's too soon to give AT&T regulatory relief. Policymakers should watch the company's growth and profits over the next three to five years. Depending on what happens, it may then be time to give AT&T the break it is demanding now. ◘

Pearce is president of Information Age Economics, a telecommunications research firm in Washington, D.C.

TELETOONS

BY FRANK AND TROISE


Communications Manager's Handbook:
·Rule 39·
How to tell when your top assistant has been on too many business trips.
Phil Frank

and another thing . . .

To hear them talk, you'd think vendors didn't sell products anymore.

Whether the company manufactures modems, multiplexers or local networks, or provides local or long-distance services, the corporate spiel is usually the same.

"We're not merely selling products," the company's top executives say, "we're providing optimum solutions to customers' networking needs. We're solving network problems."

Ask any vendor about a particular product or the company's whole product line, and similarly fuzzy statements almost invariably creep into the conversation.

The key word in all these bromides is "solutions." Once the domain of the chemist and the mathematician, solutions are the new cornerstone of network vendors' marketing strategies.

That's understandable. Given the strategic importance of networks, vendors don't want to be seen as simply the producers of discrete products and services, with specific capabilities, that sometimes work together.

They want to be viewed as allies — colleagues of users in the grand task of building networks.

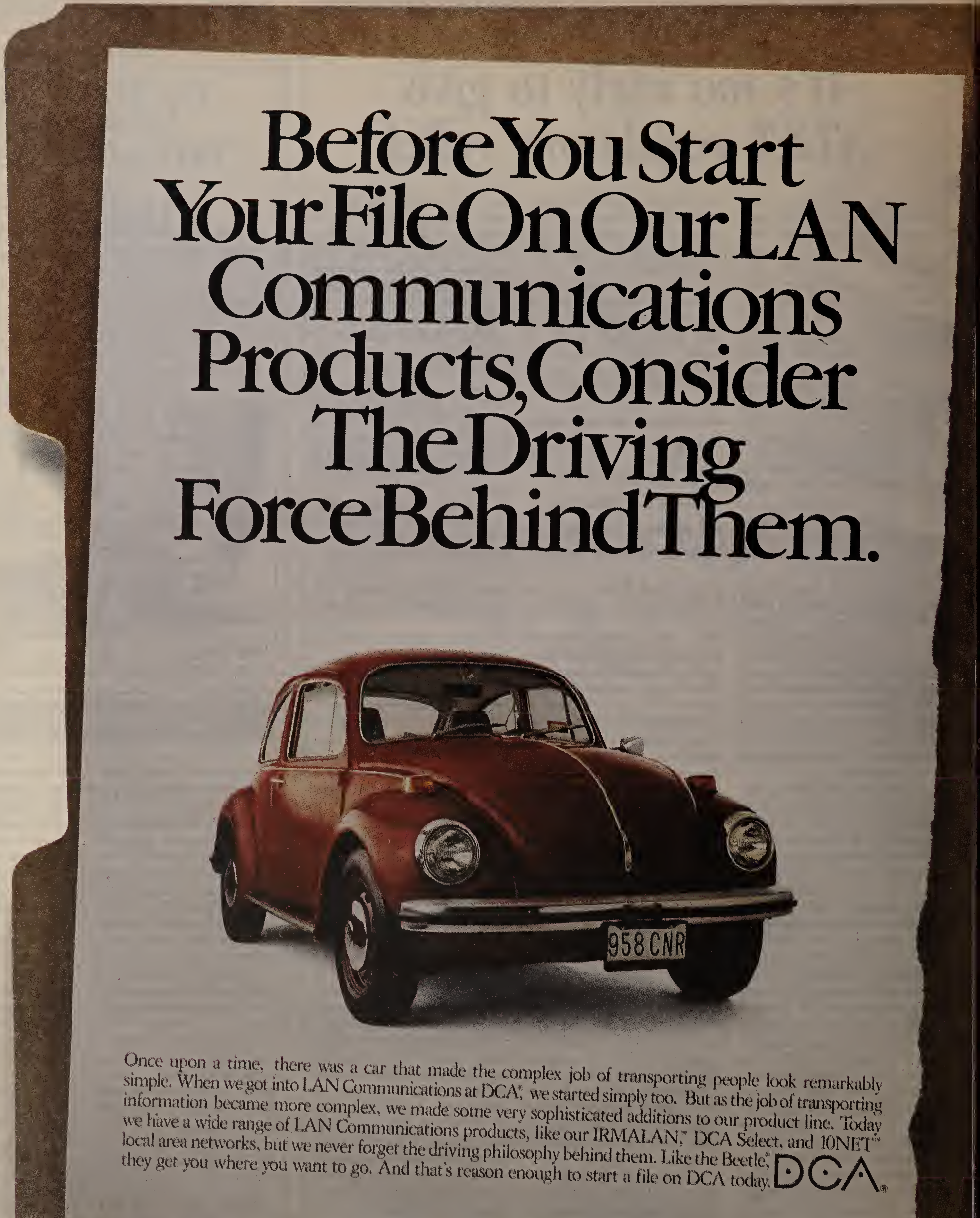
So, to avoid being left behind, we're not just a newspaper. We're here to provide solutions to your information acquisition needs. ◘

WE'VE BEEN TOLD THAT ALL THINGS COME to those who wait. Well we've waited, and we still haven't received your guest column for *Network World*'s Opinions pages. So send it in today!

Columns should be timely, opinionated, literate, thoughtful and accurate.

Manuscripts should be letter-quality, double-spaced and between 600 and 900 words in length. Disk or modem submissions are preferred.

If you'd like to write a column, contact Steve Moore, features editor, *Network World,* Box 9171, Framingham, Mass. 01701, or call (508) 820-2543, ext. 732.



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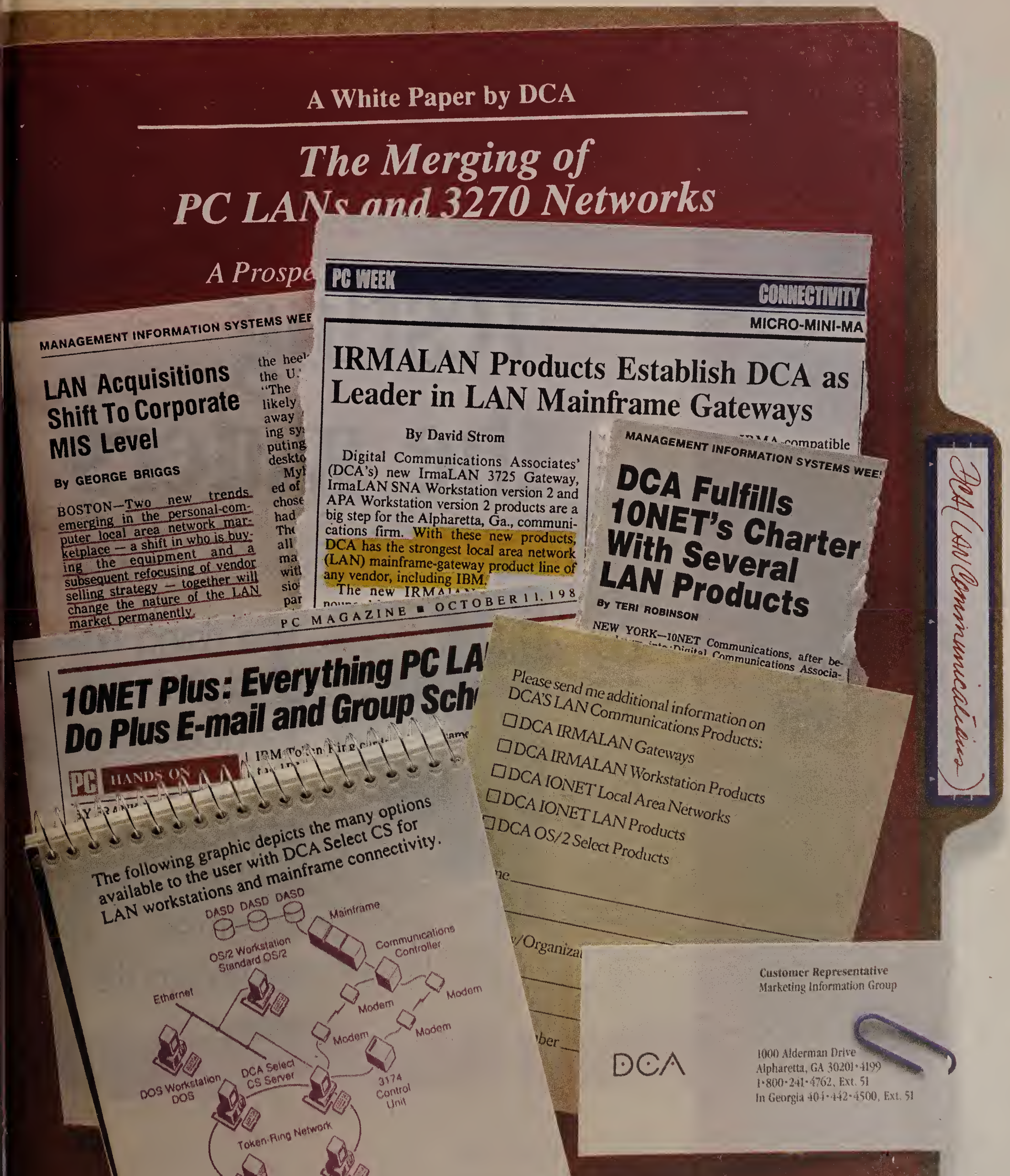

A White Paper by DCA

The Merging of PC LANs and 3270 Networks

A Prospe

MANAGEMENT INFORMATION SYSTEMS WEE

LAN Acquisitions Shift To Corporate MIS Level

By GEORGE BRIGGS

BOSTON—Two new trends emerging in the personal-computer local area network marketplace — a shift in who is buying the equipment and a subsequent refocusing of vendor selling strategy — together will change the nature of the LAN market permanently.

PC WEEK CONNECTIVITY

MICRO-MINI-MA

IRMALAN Products Establish DCA as Leader in LAN Mainframe Gateways

By David Strom

Digital Communications Associates' (DCA's) new IrmaLAN 3725 Gateway, IrmaLAN SNA Workstation version 2 and APA Workstation version 2 products are a big step for the Alpharetta, Ga., communications firm. With these new products, DCA has the strongest local area network (LAN) mainframe-gateway product line of any vendor, including IBM.

The new IRMA

MANAGEMENT INFORMATION SYSTEMS WEE

DCA Fulfills 10NET's Charter With Several LAN Products

By TERI ROBINSON

NEW YORK—10NET Communications, after be- … into Digital Communications Associa-

PC MAGAZINE ■ OCTOBER 11, 198

10NET Plus: Everything PC LA Do Plus E-mail and Group Sch

PC HANDS ON

The following graphic depicts the many options available to the user with DCA Select CS for LAN workstations and mainframe connectivity.

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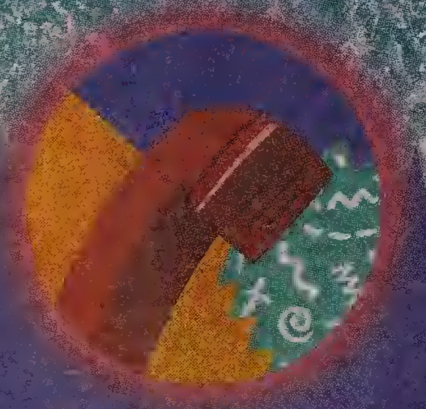
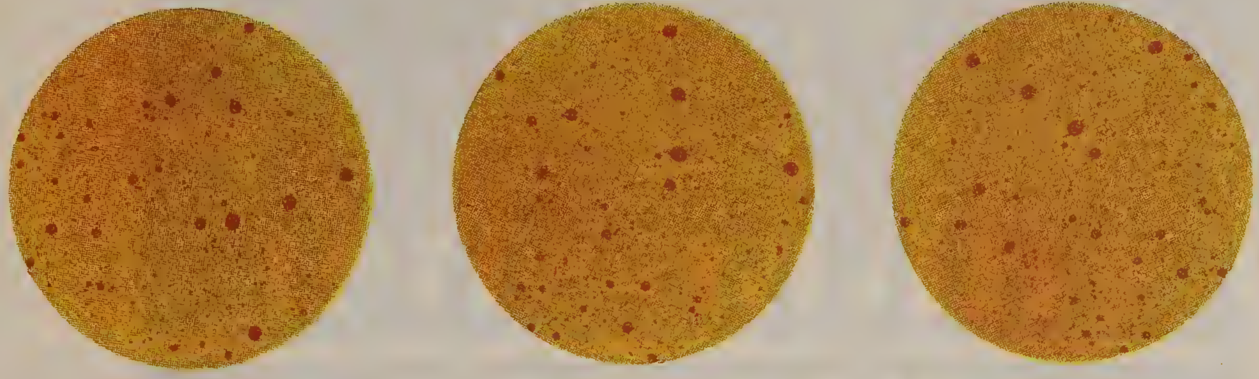


GUIDE

T-CARRIER
and DDS
TEST EQUIPMENT

Testing the waters

The rising tide of digital services brings a wave of products for DDS and T-carrier testing in its wake.



By BRUCE GUPTILL

Approximately five years after the nationwide introduction of T-1 services, more than half of the Fortune 2,000 companies are using some form of T-carrier for their data transmission needs. Lower prices, new services, expanded availability and more sophisticated equipment have fostered the digitization of U.S. business communications. The swell of T-carrier acceptance has also brought new life to formerly becalmed digital services such as AT&T's Dataphone Digital Service.

The growing use of these services has meant booming business for manufacturers of equipment used to test both the physical links and the transport services. This Buyer's Guide takes a look at what's going on in the market, what the equipment is capable of and what users should be aware of when looking for T-carrier and digital data service (DDS) test equipment.

Guptill is Network World*'s features writer.*

The T-carrier of choice

Today's overwhelming choice for high-speed digital transmission is T-1. Price reductions for T-1 services, notably AT&T's nationwide 1988 cuts, have slashed user costs by as much as 40% in some areas. More sophisticated services, such as Clear Channel Capability (CCC) and fractional T-1, have made T-1 even more attractive to users.

AT&T announced CCC for T-1 service in December 1988. Basically, CCC allows users access to more of T-1's 1.544M bit/sec transmission bandwidth; it uses only 8K bit/sec for framing and signaling information. Without CCC, users are limited to 1.344M bit/sec for data. CCC is priced by each carrier, usually at the same rate as standard T-1.

With fractional T-1, users can lease a portion of the T-1 line's capability for a proportionately reduced price. Fractional T-1 is becoming such a hit with users that it has almost eclipsed the faster, bigger T-3. According to one Wall Street analyst who requested anonymity, vendors be-

(continued on page 54)

CHART • GUIDE

The features and prices of various T-carrier and DDS test equipment are listed in a chart beginning on page 55.

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earned this triple recognition
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ONE

Most Important/Most Useful Networking/Communications Publication

It began with the 1988 *Wall Street Journal* Telecommunications Study naming *Network World* the Most Important/Most Useful networking/communications trade publication among ICA members. *Network World* notched a 34 percentage point increase in its climb to the Most Important/Most Useful position, while every other networking/communications trade publication actually lost ICA member support — by as much as 9 percentage points.

Publication	Percentage-point Increase/Decrease
Network World	34%
TP+T	-1%
Data Communications	-1%
Telephony	-2%
Teleconnect	-3%
Telecommunications	-3%
Communications Week	-8%
Communications News	-9%

Source: *The Wall Street Journal* Telecommunications Study by Erdos and Morgan, March 1986 and March 1988.

TWO

Most Helpful Publication

Then the 1988 Telecommunications Association Member Study revealed *Network World* to be the Most Helpful publication for giving managers and users the kind of news and information they need every day.

Publication	Preference
Network World	30%
Communications Week	25%
Business Communications Review	20%
Communications News	15%
Data Communications	15%
Teleconnect	15%
Telecommunications	10%
Telephony	10%

Source: 1988 Telecommunications Association Member Study.

THREE

Largest Growth in Ad Pages

And the December 1988 TA Report showed *Network World* leading all other networking/communications publications in ad-page growth. In fact, *Network World's* growth for the comparative periods exceeded that of its nearest competitor by 63%!

Publication	Ad-Page Growth
Network World	64%
Data Communications	1%
Communications Week	-5%
TEM	-12%
Telephony	-20%
Telecommunications	-20%

Source: December 1988 TA Report. Comparative growth in advertising pages for the period from January-December 1988 versus January-December 1987.

Network World delivers your advertising message to an audience of over 70,000 ABC audited buyers — who each plan to spend an average of $2.5 million on networking/communications products and services in the next 12 months. So when you're planning your strategy for reaching buyers, go for a sweep — and turn to *Network World*. Call Paul McPherson, Director of Advertising, at (508) 820-2543 to reserve your space today!

Our new 19.2 Kbps modem increases your throughput

and decreases your line costs.

The new M1928Li Trellis-coded modem is testimony to Fujitsu's continued commitment to excellence in data communications.

This enhanced 19.2 Kbps modem reduces modem throughput delay, resulting in even greater data throughput than before. And, because the M1928Li modem lets you send twice the data of a 9600 bps modem on a single line, you can save up to $1500 per month for each leased line used for coast-to-coast communications.

Like our other modem products, the M1928Li is backed by Fujitsu's comprehensive modem insurance policy and nationwide customer service.

So if you're looking for a way to increase your data throughput and decrease your line costs, take a look at the M1928Li by Fujitsu.

For the name of a Fujitsu distributor near you, call Fujitsu America, Data Communications Division at 800-422-4878; in California, 408-434-0460; and in Canada, 416-673-8666.

FUJITSU

Switchboard in the sky

The Advanced Communications Technology Satellite presages a revolution in satellite technology.

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CONTINUED FROM PAGE 1

a switch, ACTS will be an orbiting test bed for exploring advanced Ka-band and digital technologies. NASA predicts that the technology used in ACTS could increase the communications capacity of future commercial satellites by as much as five times over current technology.

"You can only push the current technologies to a certain state, and then there has to be a quantum jump," says Robert Bauer, ACTS experiments program engineer. "We feel that ACTS is that next quantum leap in satellite technology."

Conceived in 1979 and scheduled for launch in May 1992, ACTS is NASA's most ambitious communications satellite to date. By allowing a fully interconnected mesh network of high-capacity transmissions to reach areas not easily accessed by land-based networks, ACTS technology can replace the expensive cable and microwave links now used to extend service into remote areas. This will free businesses to locate far from the networks that now serve only major metropolitan areas.

ACTS technology shows the greatest promise for business, scientific and medical applications that require expanded data distribution capacity using small earth station technology or expanded and more cost-effective routing flexibility, according to Louis Bransford, president of the Public Service Satellite Consortium, a NASA contractor that maintains an ACTS document library and coordinates ACTS program relations with the public and Congress.

Herbst is a free-lance writer based in Washington, D.C.

ACTS is well-suited for a number of applications. Among them are consolidating high-speed data, facsimile, duplex voice and full-motion, high-resolution video communications; allowing inexpensive rooftop-to-rooftop transmissions at varying rates for shared tenant services (for instance, in an industrial park with client companies that have a range of requirements); and rapid data base access and transfer (such as distributed computer processing and electronic data transfer).

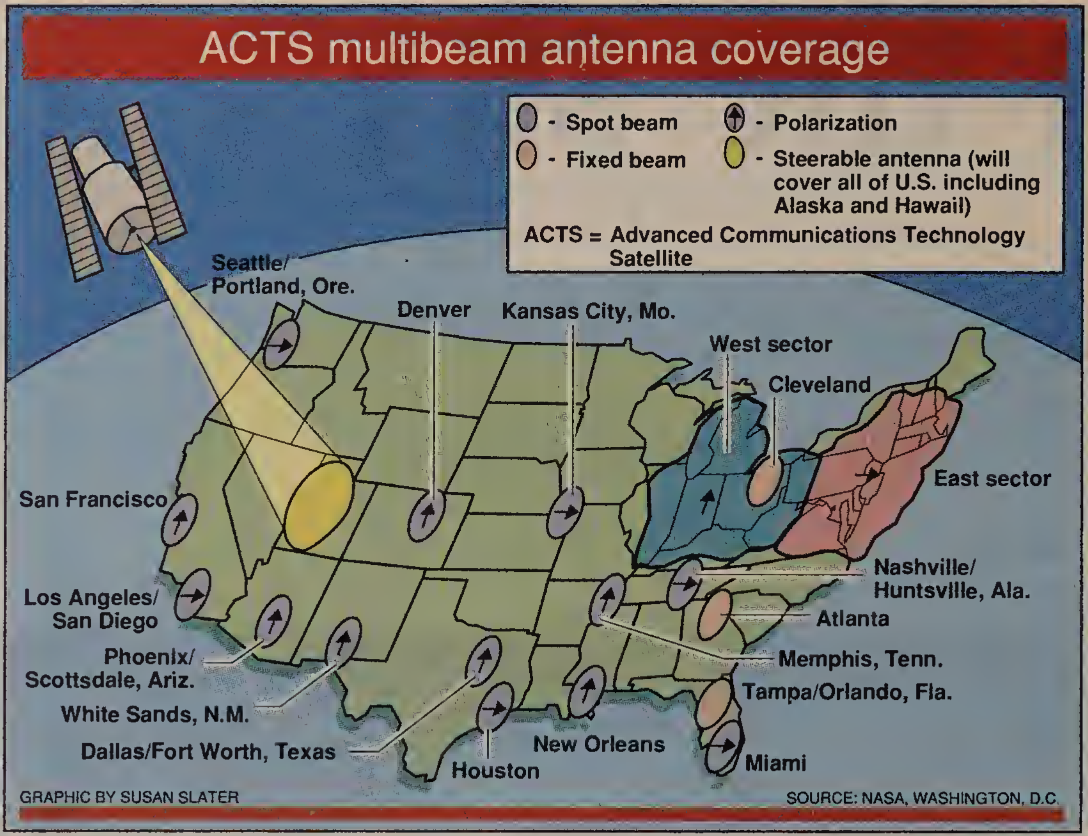
Other applications include video networking (teleconferencing and high-definition television) and communications between the micro (1.2- to 1.8-meter diameter) very small aperture terminals used for emergency communications restoration and transportable communications.

Because ACTS handles high data rates using relatively small earth stations, it has attracted the interest of information industries. These include libraries, information networks and corporate in-house information cen-

(continued on page 40)

(continued from page 39)

ters, as well as researchers and engineers involved in telescience and telerobotics (interactive experiment planning, design, development, command, control and analysis among distributed experiment participants).



ACTS multibeam antenna coverage

GRAPHIC BY SUSAN SLATER

SOURCE: NASA, WASHINGTON, D.C.

How it works

ACTS will be the first satellite to combine direct 30/20 GHz Ka-band transmission between premises-based VSAT earth stations with highly flexible, space-based switching. (The ACTS satellite has a 2.2-meter, 30-GHz receiving antenna and a 3.3-meter, 20-GHz transmitting antenna.) It will be capable of handling a wide range of communications, from sporadic phone calls to high-volume data transmissions, on an on-demand basis.

Featuring an on-board baseband processor switch (see "Advanced technology of ACTS," this page), ACTS will replace the wide broadcast footprint used by most satellites with a unique system of powerfully focused, hopping spot beams. Through adaptive, on-demand channel allocation, ACTS will provide a continuously changing bandwidth that transparently accommodates changing user needs.

"With ACTS, you only use the amount of transponder space that you actually need for your transmissions, and you only pay for what you use," Bransford says.

In addition, ACTS will combat one of the great enemies of satellite transmission — signal fade due to atmospheric conditions — in two ways. One is the automatic, dynamic reassignment of reserve transmission capacity and source coding. Before a fade reaches sufficient depth to affect the transmission signal, ACTS will sense it and reassign channel capacity to increase the signal and combat the fade. ACTS will also experiment with a source coding strategy that makes it possible to increase the signal strength without the need for this reserve capacity.

Experimental interest

Once launched, the ACTS satellite network will be available to experimenters who want to test its capabilities or develop compatible technology. The satellite is designed to last two years, but by using the on-board fuel efficiently and barring any mishaps, its life span could be extended to four years. The satellite is now in production at General Electric Co.'s Astro-Space Division in East Windsor, N.J.

About 100 organizations have indicated interest in experimenting with ACTS, including common carriers, corporations, professional associations, universities and government agencies, according to Bransford. ACTS experimenters must provide an overall experiment plan, funding, equipment and the staff to conduct and analyze the experiment results.

"This is the only effort in the U.S. to pursue these technologies," NASA's Bauer says. "We're hoping the industry will look at it and get involved."

Since NASA launched its first geosynchronous communications satellite, Syncom 2, in 1963, the space agency has served as a technology trailblazer for the country's satellite communications industry. Although Syncom was designed for voice and data transmission, NASA scientists soon discovered that it could also carry a clear television signal.

A decade later, NASA's experimental Applications Technology Satellite (ATS) series ushered in the era of cable TV broadcasting by proving that smaller, low-cost earth stations could handle broadcast-quality signals using high-powered communications satellites.

Business TV and data networking are direct spin-offs of NASA's Communications Technologies Satellite (CTS) program, which operated during the late '70s and demonstrated the feasibility of smaller, less expensive Ku-band earth stations.

Support can be fickle

ACTS is now the main focus of NASA's communications program. But despite rapid advances by the satellite communications industry during the past two decades, the technology's bloom has faded in recent years. Other technologies have stolen some of the thunder. Long-distance competition has pushed down terrestrial communications prices, and inexpensive bandwidth has become available on fiber-optic networks.

Keenly aware that competition from Europe and Japan is threatening U.S. domination of the global satellite communications market, NASA is trying to rally support for ACTS within the U.S. business community. Unfortunately, NASA, struggling to recover from the Challenger disaster, is finding that the past and potential beneficiaries of its research and development programs have become more fickle.

"I've worked on the ATS and CTS programs, and at the time, there was great interest because there was a desperate need for satellites," Bransford says. "Today, users are not as hungry as they were a few years ago. We don't have people breaking the doors down to get at us to experiment on ACTS.

"Also, we have a consumer population that isn't really loyal," he continues. "They are going to go out and buy whatever is cheaper, better and available today. So when we say, 'We can get you a T-1 circuit that has on-board baseband processing, giving you tremendous switching capability in 1992,' they say, 'Well, I need something today.'

"Our job is to try to find organizations that have this requirement and desperately need it, but they just don't know it yet," Bransford says. "That's tough because a lot of them are still trying to define their own needs.

"For example," he says, "we could connect supercomputers and make better use of their communications capability. I have been talking to a lot of the big institutions that are acquiring supercomputers, and they are saying, 'Look, I'm not ready to talk to that other supercomputer at such and such data rates. I'm still trying to figure out what I'm going to do with this supercomputer!' So we find ourselves in a lot of catch-22 situations. It's no longer a seller's market, as it was in previous experimental programs."

Foreign competition

"The profit margins are razor thin if you look at the top four companies: AT&T, MCI, US Sprint and American Satellite [Co.]," says Ron Schertler, ACTS project experiments manager. "It's a very tough market to operate in. We're finding very little money is put into advanced R&D, and they are really looking to the next quarter's profit.

"We're afraid — and we see it coming — that the Europeans are funding these advanced programs [baseband processors, Ka-band, multibeam antenna type of systems] at a very high rate,"

(continued on page 49)

Advanced technology of ACTS

The most innovative feature of NASA's Advanced Communications Technology Satellite (ACTS) is its on-board baseband processor (OBP), which interconnects two hopping spot beams. ACTS will be the first satellite to use an OBP, a major technological advancement that has been described as a "switchboard in the sky."

"It's a switch that is similar to a central office on the ground, only it will be on the spacecraft itself," says Robert Bauer, ACTS experiments program engineer. The OBP is intended for use in nets of customer premises-based terminals or very small aperture terminals carrying light traffic.

The OBP uses modems, coder/decoders, I/O memories, a routing switch and a central digital routing processor to perform both time and space switching. By using on-board-stored baseband-switched Time Division Multiple Access (TDMA), it provides demand assignment access and full-mesh interconnectivity.

Each ACTS ground station only needs to provide one uplink burst per TDMA frame (1 msec) containing all its traffic to all beams. This greatly reduces overhead because the OBP does the sorting. A master control station at the National Aeronautics and Space Administration's Lewis Research Center in Cleveland uses a Digital Equipment Corp. VAX 8600 computer and a 5-meter, 54-watt antenna to assign space segment capacity.

During each frame, ACTS can demodulate a stream of data at up to 110M bit/sec from each of the two uplink beams, allocating each uplink burst to an input memory with 1,728 64-bit channels. In the subsequent frame, this data is routed to one of two output memories (one for each downlink beam), depending on the channel's final destination.

During this process, signals are regenerated, thereby reducing errors by providing several decibels (db) of link improvement. This is an advantage over intermediate frequency switching. In the next frame, the data is read from output storage locations, modulated and transmitted on a downlink beam when it hops to the desired location.

The spot beams can hop to many locations in a single frame (see chart, this page) and can be kept stationary at any location. By adaptively varying the dwell time of the hopping beams so that the traffic demand of the terminals at each location is satisfied, the satellite's capacity is matched to the nonuniform, instantaneous demands of traffic.

The spot beams' half-power beamwidth of 0.33 degrees allows spatial separation between simultaneously operating beams because each beam covers only a 135-mile diameter. Focusing the beams on a small area provides 20 db more gain than conventional beams that cover the entire U.S., thus permitting single-hop transmissions between VSAT terminals.

ACTS' uplink gain-to-noise temperature ratio of 16 db per 1 degree Kelvin at an uncoded burst rate of 110M bit/sec should help it achieve excellent uplink signal-to-noise ratios over the coverage area with a 40-watt ground terminal amplifier and a 2.4-meter dish.

Because they are spatially separated and have opposite polarization, spot beams can share the same frequency, making efficient use of scarce satellite frequencies. Polarization is also opposite for each beam's uplink and downlink, which usually do not hop to the same point at the same time. The two hopping beams are actually four beams, hopping independently.

By receiving at 30 GHz and transmitting at 20 GHz, ACTS opens up the Ka-band spectrum to U.S. satellite communications. However, if Ka-band communications proves uneconomical, ACTS technology is readily adaptable to the Ku band (14/12 GHz). Because rain and thick cloud cover cause severe fade degradation for Ka band, ACTS uses adaptive coding and power control techniques.

— Kris Herbst

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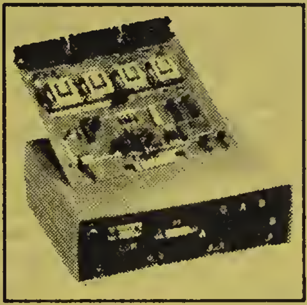

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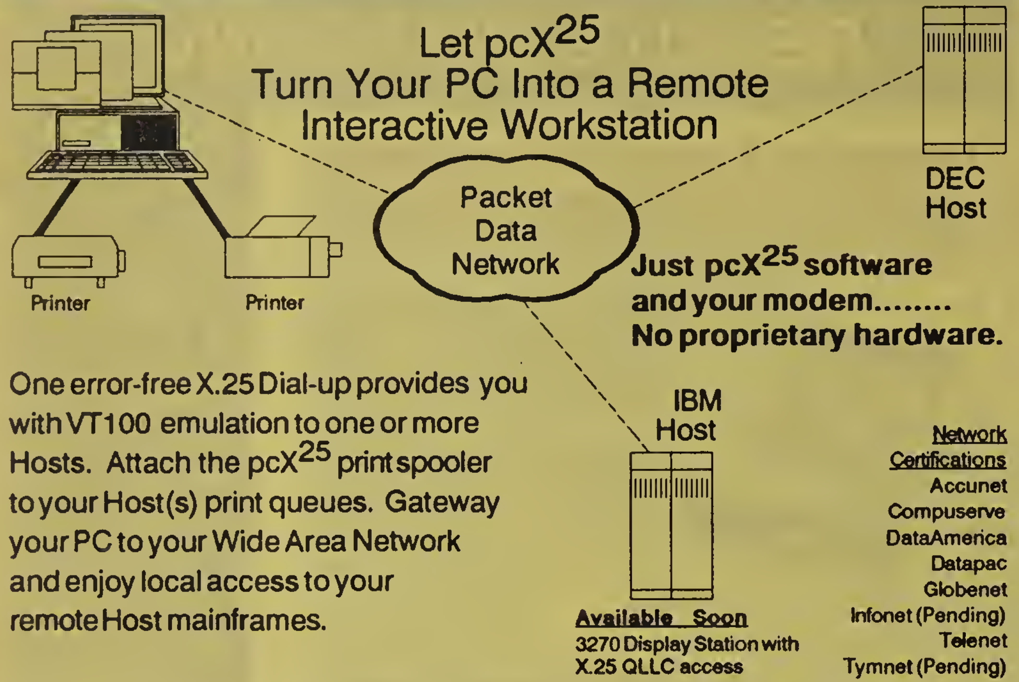

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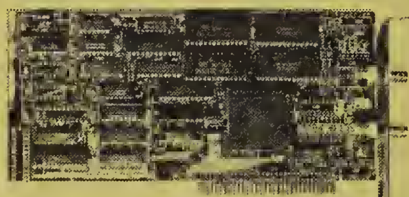

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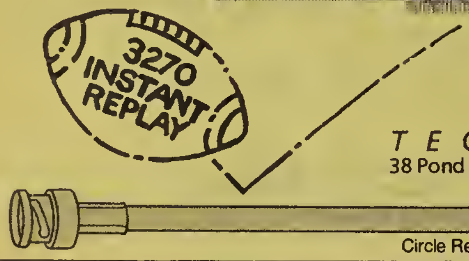

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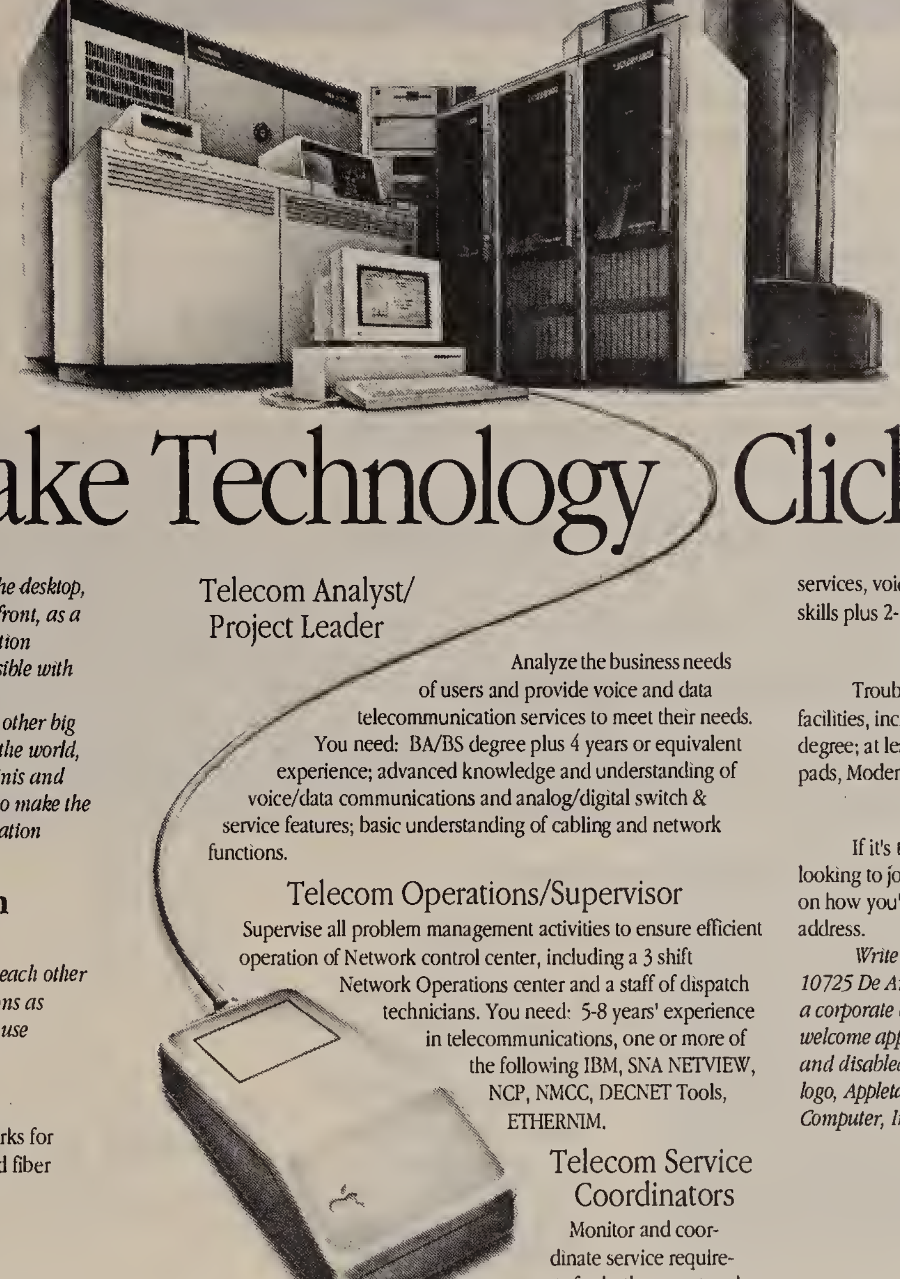

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Switchboard in the sky

continued from page 40

Schertler says. He says the European Space Agency recently indicated it will budget several hundred million dollars per year over the next five or six years for these programs.

"So we see foreign competition is real," Schertler says. "We are going to get to the point where, instead of the U.S. taking the lead and selling these systems to the world, we will be a third or fourth partner to the Europeans and the Japanese." He notes that the French are already competing head-to-head with the U.S. in the market for rocket launches and remote sensing satellites. And then there's Arianespace S.A., a consortium of 11 European nations formed to launch rockets.

"When Arianespace came on board a few years ago, we sort of laughed at them," he says. "You know: 'Arianespace, you're building rockets to launch commercial vehicles? We'll give you our leavings!'

> "We are going to get to the point where

Congress shares this concern about foreign competition. ACTS supporters argue that the satellite is the blueprint for the future of telecommunications and, as such, should not be surrendered to foreign competitors.

"It's a question of who is going to develop this technology," Rep. Nelson says. "Is it going to be Japan or Europe, or is it going to be us? We are developing a technology that is going to be important to the country. If we get it done in time, get it out on the market and beat Japan, the U.S. can then reap the benefits."

However, according to a congressional aide who asked to remain anonymous, "This program has had a lot of ups and downs." Congress had to reinstate funding for ACTS after it was canceled by President Reagan's Office of Management and Budget in fiscal years 1985, 1987 and 1988.

Again in 1988, that office did not request ACTS funding for the 1989 fiscal year budget, the administration's position being that funding for ACTS should be the responsibility of the private sector. Congress reacted by appropriating $76 million for the 1989 fiscal year.

"That's tough sledding," says William Schmidt, program director for ACTS at Comsat Laboratories, a division of Communications Satellite Corp. in Clarksburg, Md. "The support of Congress has been very important to the program."

> "Congress has been supportive of ACTS, even though the administration has not," Rep. Nelson says.
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NASA selected the technologies used by ACTS for their potential to enhance satellite communications far beyond what the private sector can afford to develop, and Congress has supported this with the necessary funding.

"Congress has been supportive of ACTS, even though the administration has not, because we feel it is the development of a new technology that can be applied to the marketplace," Nelson says. "Private enterprise can't shoulder the entire financial burden of the R&D — it's just not going to happen."

TRW and cost overruns

Yet even congressional supporters of ACTS were shocked when they learned a little more than a year ago that TRW, Inc., which had contracted to develop the ACTS communications package, was incurring major cost overruns. "We did become concerned about the fact that it seemed to be running away in cost," the congressional aide says. "I think TRW would admit they had let the thing run out of hand."

Congress responded in 1988 by removing TRW from the ACTS program and placing a $499 million ceiling on total funding

(continued on page 51)

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NWWB

(continued from page 49)

for the program. The funding limit "was a decision between the House and Senate appropriations committee staffs, committee members and NASA," the aide says. "NASA was also concerned about the fact that [the program] was running away."

"It was a substantial shake-up," Schmidt admits. Since the funding cap was imposed, he says, "we've all been faced with the equivalent of a fixed-price contract, and it has made life difficult in some ways."

Because of limited federal support, the ACTS staff has been scrambling to find ways to raise funds needed for building the VSATs that will be used by ACTS experimenters.

Schertler says NASA is considering establishing "a nonprofit foundation that would pool industry resources, buy a group of 10 to 20 terminals and then make these available to members based on their contributions. In addition, we might make these available for lease by nonmembers interested in doing some experiments with the satellite."

Trunking mode eliminated

Economic considerations have also virtually halted further development of one of the two switching systems planned for ACTS. NASA has placed development of an intermediate frequency microwave switch matrix on the back burner in favor of ACTS' more innovative on-board baseband processor switch.

> "We've all been faced with the equivalent of a fixed-price contract," William Schmidt says, "and it has made life difficult in some ways."
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The microwave switch matrix is the same type of switching system that will be deployed on the next generation of satellites built by the International Telecommunications Satellite Organization. This matrix is designed to carry high-volume, trunked traffic that is predictable and nearly uniform between fewer than 100 earth stations on three stationary spot beams.

"At one time, the objective was to try and have a very high throughput rate on the satellite," NASA's Bauer says. "But when fiber-optic cables came into play, they virtually took over all satellite trunking. Looking at the market today, I don't foresee a lot of trunking being done on satellites. So although that mode wasn't eliminated on ACTS, it's never been emphasized either."

Still, there are some who think there may yet be a role for satellites as a backup system for fiber trunks.

"I think the optical fiber situation could even help the market for satellite communications because optical fiber and satellite technology are now more akin to each other than ever before," Schmidt says. "They use similar sorts of signal formats that seem to be converging, so it has become much easier for satellites to provide a backup for fiber.

"I think some people may have gotten religion on that recently when a few of the optical links [in the New York-Washington corridor] were cut by backhoes," Schmidt continues. The owners of the fiber cables "found out they had no way of restoring the circuit services, and they had to turn to other companies."

Schertler sees several possibilities for the future of ACTS. "A regional Bell [holding company] could use an ACTS-type satellite to restore service," he says. "Perhaps it could use ACTS for peak demand, off-loading rather than putting in a lot of extra circuits. Perhaps ACTS could provide thin route service to nonmetropolitan areas. We're trying to interest people in the fact that ACTS could be very complementary with existing telephone services.

"As telecommunications demand grows, fiber just isn't going to be everywhere; and you see complaints from customers in rural areas saying they haven't been given their fair share of telephone services," Schertler says. "The telephone company sort of thumbs its nose at them. Large trunk lines are not available [to them]. Perhaps an ACTS type of satellite could be used with an RBHC."

As the launch date for ACTS approaches, the support of the private sector will be critical to the satellite's success. However, NASA must convince potential users that now is the time to invest in the next generation of communications satellites. ◘

> There are some who think there may yet be a role for satellites as a backup system for fiber trunks.
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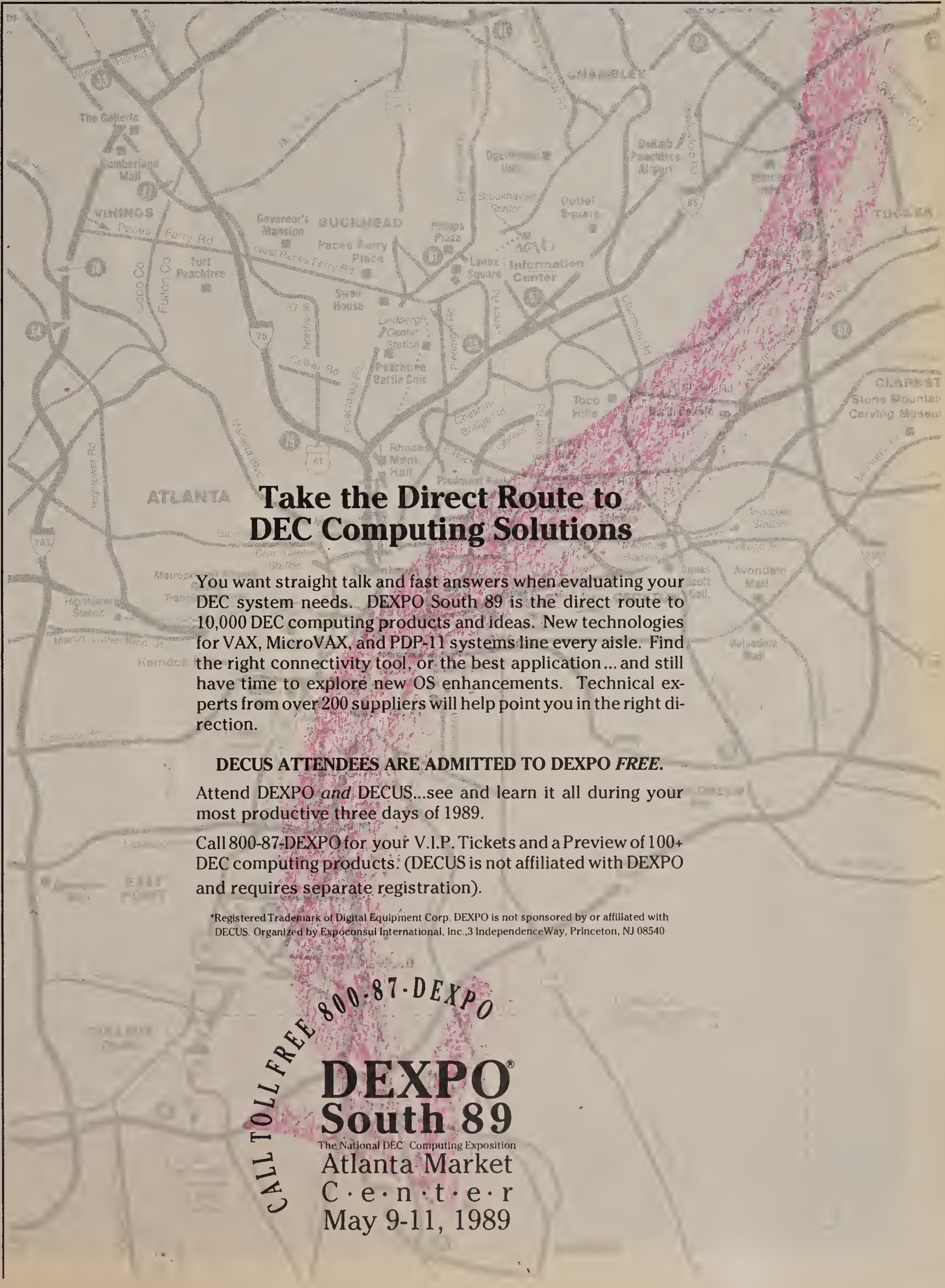

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Dan: It was like a blueprint for a data superhighway.

Jim: We put our ISN wide-area network at the center—like an interchange—and built fiber and twisted-pair data lanes to applications running on AT&T 3B2s, DEC, UNISYS and other hosts located in all the departments. We put on- and off-ramps in strategic locations: StarLAN networks that gave access to the highway from workstations.

Dan: We designed everything from the user perspective. The more technically remarkable the system became, the harder we worked to make it approachable.

Jim: Easy for novices, powerful enough for programming students.

Dan: We developed a menu-driven user interface that is consistent and clear. Students and faculty can select applications like checking spelling, transmitting course grades, even browsing through the on-line card catalog of 1.5 million books at the University of Wisconsin–Madison. We wanted desktop power and access, but we wanted to process information where it made the most sense.

Jim: Thinking back, we realized early that the complexity of your vision precluded a single-system focus. You needed open systems.

Dan: You were really the only ones that understood this point. Open systems allow us to use off-the-shelf components; vendors have to bid against each other to get our business. Open systems are the secret.

Jim: It's mind-boggling how much computer power is out there. We wanted to harness it all, yet give a piece to every individual.

Dan: A truly distributed network, one we don't think we'll ever outgrow. We've added 300 WGS workstations in the last five months.

Jim: Dan, where in the world is that wallpaper today?

Dan: We had it bronzed. Today, so many colleges and businesses really need a similar solution. That's probably why we've had so many visits from them lately.

Jim: Little did we know back then, when we first met.

Dan: Oh, something tells me you had a hint.

The Stevens Point Solution:

THE CHALLENGE:

Create a distributed computing revolution; link the campus into an integrated information resource open to every user.

THE SOLUTION:

AT&T 3B2 computers support a multitude of UNIX® System V-based applications. AT&T StarLAN connects AT&T WGS computers, a variety of micros, and hosts together. The AT&T Information Systems Network (ISN) is every campus user's gateway to all computer resources.

THE RESULT:

Stevens Point has been designated a Center of Excellence for Distributed Academic Computing by the Board of Regents for the entire University of Wisconsin system. The majority of the 9000 students on campus regularly use the network for coursework and homework. Faculty have integrated computing into 41% of their coursework.

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Testing the waters

continued from page 35

lieve more opportunities exist in the fractional T-1 market than in T-3. Pressed for numbers, she says there are "hundreds of thousands" of potential fractional T-1 users and only a "handful" of T-3 users.

Reasons vendors offer for the lack of popular support for T-3 include its higher price and potentially higher operational risks. The service offers economic advantages over multiple T-1 lines, but few users send enough data frequently enough to justify the price. And companies are understandably wary of putting all of their network traffic on one giant line.

Technical hurdles

More than 70 firms manufacture or sell testing equipment for T-carrier and other digital services, and vendors don't see the market slowing down. In addition to increasing T-carrier use and more sophisticated services, evolving standards and incompatibilities between T-carrier customer premises equipment and provider equipment mean business for test equipment vendors.

Increasing T-carrier use and evolving standards and incompatibilities between T-carrier customer premises equipment and provider equipment mean business for test equipment vendors.

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"Things are going to get worse before they get better," says Wesley Simpson, senior product manager for Wilcom Products, Inc. in Laconia, N.H. "There's going to be a big struggle about the facilities data link on extended superframe format. There are two different performance monitoring schemes: AT&T's 5406T spec and the new T1E1 spec. Those are completely incompatible." Simpson says this is only one technical development likely to muddy the T-carrier waters.

"A couple of other things will interfere with that data link," Simpson explains. "The Zero Byte Time Slot Interchange is one." ZBTSI is an alternate method for zero code suppression that does not use bipolar violations (BPV); it can handle clear-channel, full-blown 64K T-carrier without using BPVs.

"ZBTSI is advantageous for certain parts of the network, specifically the repeaters," he says. "Right now, in order to implement [bipolar eight zero code substitution], a carrier has to replace a bunch of equipment." He adds that some carriers, including US West, Inc., don't want to spend the money to replace equipment and are going to use ZBTSI. However, a problem with ZBTSI is that it takes up 2,000 bit/sec out of the 4K bit/sec data link. This makes for some contention between ZBTSI and B8ZS, he says.

The other specific area in which Simpson foresees problems is the use of adaptive differential pulse code modulation. "There are a couple of different schemes right now," he says, and this is causing differences in vendor and carrier offerings.

The differences in carrier and user equipment, combined with disagreement on standards, create a greater need for testing the equipment and the carrier links.

"It's the 'rising tide floats all ships theory,' " says Nick Stanley, product manager for test systems at ADC Telecommunications, Inc. in Minneapolis. "It also increases the number of competitors, of course, which we're not too happy about."

"It's good business for us test guys," Simpson says. "There's going to be compatibility problems until a real standard is agreed upon. [Standards groups] have to leave room in the specs for future enhancements; when those enhancements aren't compatible, there has to be some way to tell which manufacturer to call to get something fixed."

It's in the box

More and more customer premises equipment vendors are incorporating basic testing facilities into their products. So-called "intelligent" equipment, such as multiplexers and data service units/channel service units (DSU/CSU), will have different levels of T-carrier testing ability. But don't look for the stand-alone testing equipment to fade away.

"Whenever you install T-carrier equipment or need to troubleshoot, 99% of the time you'll need portable test sets to do it," says Thomas Murray, product marketing manager for Telecommunications Techniques Corp. (TTC) in Germantown, Md. "Most CPE vendors aren't in the test equipment business. They might put in real basic diagnostics, like BPVs or frame errors; for the most part, that's not going to help users verify what's wrong with the circuit or where to find the fault."

"There will be a steadily increasing amount of testing that CPE can do," Wilcom's Simpson says. "However, I don't see the need for a portable test set going away. The sophisticated CPE will give users the opportunity to avoid routine testing. If the CSU is going to give you the error reports, there's no need to hook up a test set every couple of weeks to make sure the span is working. So, you'll only use a portable test set for fault isolation and repair."

"Vendors are starting to say, 'All this [testing] stuff is being built into our network equipment,' " says Len Evenchik, Boston-based director of data communications for the Commonwealth of Massachusetts. "But that harkens back to 'Trust me, I'm with the government.' I want to see it built in, but until the built-in equipment is more mature, I want to use the stand-alone equipment."

T-1 test features

Users and vendors have definite ideas as to what should be included in T-1 test equipment.

"Look for a wide range of features that the carrier has to support," says Bill Myers, a staff specialist with E.I. du Pont de Nemours & Co. of Wilmington, Del. "Specifically, test equipment must have D4 and ESF capability, and in some cases, Clear Channel Capability. It must be able to run and recognize a variety of test patterns, specifically quasi-random signal source, all Ones and others.

"B8ZS capability vs. alternate mark inversion will become more important," Myers adds. "B8ZS isn't in use much yet, but we'll see more of it." Myers says du Pont uses TTC's T-Berd 209 (see chart, page 55).

"The most important things users have to do is decide whether they want in-service testing or out-of-service testing," Simpson says. "Each needs different types of equipment, and users can perform different types of tests with the equipment."

More and more customer premises equipment vendors are incorporating basic testing facilities into their products. But don't look for the stand-alone testing equipment to fade away.

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For out-of-service testing, a bit error rate test set is most often used. The bit error rate test set sends out a quasi-random pattern of bits — combinations of ones and zeros — on a T-1 line in place of the 24 channels of information. With this, users can precisely measure how many bit errors there are on the system.

Most of the telephone companies use bit error rate tests when installing T-carriers for the first time. But once a span is up and running, users usually cannot afford to take the whole line down just for testing.

"The most important things users have to do is decide whether they want in-service testing or out-of-service testing," Wilcom's Simpson says. "Each needs different types of equipment."

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In-service testing uses the traffic on the T-1 line. Two basic types of tests can be performed. One is performance monitoring, in which the equipment searches for errors such as BPVs. Users can also look for cyclic redundancy check errors on ESF lines and can check for framing bit errors on any line (superframe or ESF).

The other popular form of in-service testing is channel access testing. The test set extracts a single channel from the T-1 line, such as voice, data, a modem tone or a DDS circuit, and examines it. A T-1 line may be running flawlessly and still have a problem in one channel. The carrier may send a whole T-1 out and route different channels to different locations in a user's network. If a channel is incorrectly routed or the switch is programmed incorrectly, the channel could go off into oblivion.

A problem with in-service testing is that every error cannot be detected. For example, if a data bit gets corrupted, it might not show up as a BPV. A reason for this is that BPVs are cleaned up at every network element, such as a digital access and cross-connect system (DACS) or a high-speed multiplexer. Framing bit errors incur similar problems; often, when the data goes through the DACS, framing patterns on the T-1 lines are replaced. This precludes test equipment from performing a true end-to-end check of the T-1 line.

"To do true end-to-end testing," Simpson says, "you need [bit error rate testing] or quasi-random. But there are two big problems with quasi-random. First, you can only do it for a little while, and if you don't happen to find an error, you won't be able to measure the true error rate. Second, it is a pattern deliberately designed to stress the line; it's not necessarily realistic. It may cause more errors than actually appear in normal day-to-day use."

Most of the sets on the market today will allow both performance and channel access testing. Some lower end boxes do only one or the other. Likewise, most vendors make either an in-service or out-of-service box; a few offer boxes that do both. The vendors should be contacted for more information on individual testing capabilities.

Fractional T-1 hasn't yet made itself known in the testing arena. "Fractional T-1 really doesn't make any difference in the T-carrier equipment itself," TTC's Murray says. But the growth of fractional T-1 and other sophisticated T-carrier services means that users should look for flexibility in testing capability.

"One of the important things in test equipment is having flexibility built into it, either through hardware or software," ADC Telecommunications' Stanley says. "The important thing to know is, as services develop, can the test set be updated via software or hardware changes?" Several vendors offer software or user-programmable testing. Some also offer hardware modules for different types of testing.

Other factors to consider are alternating current power vs. battery power, portable vs. desktop, and the ability to print out test results and control testing remotely.

There are some capabilities not yet available that users would like to see vendors incorporate into testing equipment.

"I'm asking the test equipment vendors to add analysis functionality in the way of specifications and trend analysis to their standard boxes," says Evenchik of the state of Massachusetts. "The specs should be in there and

(continued on page 58)

T-carrier and DDS test equipment (continued on page 56)

Vendor	Product	Connection	Frame format	Time slot sequence	Line coding	Operating modes	Measurements and indicators	Status reports generated	Status display/display type	Features	DDS/DTE testing	Warranty/price
ADC Telecommunications, Inc. **Minneapolis** **(612) 835-6800**	ADC Series 2000	Western Electric 310, bantam jack	Unframed, SLC96	D1D, D2, D3/D4, SLC96	AMI, B8ZS	1 through 5	1 through 5, 7, 8, 9, 11 through 15, 17, 18, 19	1, 2, 4 through 8	Screen, printed/LCD	Error injection: single error; error rate: 10^{-6} to 10^{-3}; printer port: serial, internal clock/calendar, AC power, user-programmable loop codes for NID devices	None	1 year/$7,995
Anritsu America, Inc. **Oakland, N.J.** **(201) 337-1111**	ME3401A DS1/DS3 Test Set	BNC, 310	DS3, DS2, DS1C and DS1 frames conform to Bell standards, while DS1 can be either D4, ESF or unframed	NA	B3ZS for DS3, B6ZS for DS2, AMI for DS1C, AMI or B8ZS for DS1	1, 2, 5	3, 4, 5, 6, 8, 9, 11, 13, 15, 17, 18, 19	4, 5, 6, 7	Printed/LCD, internal printer	Error injection: single error; error rate: 10^{-2} to 10^{-9}; internal clock/calendar; AC power; pattern select: external 1000, 1010, 1100, 1111, PRBS	Allows testing of DDS carrier lines	1 year/$8,450
Atlantic Research Corp. **Teleproducts Division** **Springfield, Va.** **(703) 644-9190**	Interview 50	DB25, RJ-48, RJ-45, double bantam jack	ESF, SF, CEPT	D1, D2, D3/D4, SLC96, CEPT	AMI, B8ZS, HDB3, B7	1 through 5	1 through 19	1 through 8	Screen, printed/LCD	Error injection: single error; error rate: user-selectable; printer port: serial; pattern select: all ones, QRSS, programmable, internal clock/calendar, AC/DC power	Allows testing of DDS carrier lines and DTE, including all tests listed	1 year/$11,225
Bowmar/ALI, Inc. **Telecommunications Division** **Acton, Mass.** **(508) 263-8365**	273D	Bantam jack	ESF, SF	D3/D4	AMI, B8ZS	1, 5	1 through 5, 7, 8, 9, 11, 13, 15, 18, 19	1, 3 through 8	Screen, printed/LED	Error injection: single error; error rate: 2^{-3} to 2^{-7}; printer port: serial; pattern select: all ones, QRSS, user-programmable; internal clock/calendar, AC power	Allows testing of DDS carrier lines, includes general-purpose T-1 test set	1 year/$3,925
Bradley Telcom Corp. **Leonia, N.J.** **(201) 461-5903**	CD-DDS	DB25, KS20908/ 20909	NA	D1D, D2, D3/D4	AMI	1, 2, 3, 5	1, 2, 5, 11, 13, 17, all KS set capabilities (when connected to KS sets)	1, 4, 5, 8	Front-panel display/LED	Pattern select: QRSS, external data, 2047 test word; internal clock/calendar, AC power	Allows testing of DDS carrier lines, performs all tests included in KS20908/20909 test sets	1 year/$6,500
Canoga-Perkins **Chatsworth, Calif.** **(818) 718-6300**	540A Automated PCM Fault Locater	Western Electric 310	SF	D3/D4	AMI	1	2, 4, 5, 6, 8, 9, 19, noise/loop resistance, tip-to-ground resistance, ring-to-ground resistance	1, 4, 6, 7, reports on repeater status, compares good vs. bad span line	Screen, printed/LED	Printer port: serial; error rate: 10^{-2} to 10^{-7} selectable; pattern select: all ones, QRSS, QRW; AC power	None	1 year parts and labor/$6,695
CASE/Datatel, Inc. **Cherry Hill, N.J.** **(800) 424-4451**	DCP2083	DB25, RS-422, Military Standard 88	ESF	NA	NA	1, 5	2 through 6, 8, 9, 16, 19	1, 3, 6	Printed/LED	Error injection: single error; printer port: serial; pattern select: all ones, user-programmable; internal clock/calendar, AC power	Allows testing of DDS Carrier lines	1 year/$4,975
CSE Technologies **Berry Test Sets** **New London, Minn.** **(800) 428-9267**	8406 L3	DB25, 310, bantam jack	ESF, SF	D1D, D2, D3/D4	AMI, B8ZS	1, 2, 5	1, 2, 4 through 9, 11 through 15, 17, 18, indication of A & B bit status	1, 2, 4 through 8	Screen, printed/LED	Error injection: single error; printer port: serial, internal; pattern select: all ones, QRSS, framed SF and ESF; internal clock/calendar, AC/DC power	None	1 year/$2,800
Digilog, Inc. **Montgomeryville, Pa.** **(215) 628-4530**	T-Tester Model 500	Bantam jack	ESF, SF, unframed	D1D, D2, D3/D4, SLC96	AMI, B8ZS	1, 2, 3, 5	1 through 13, 15 through 19	1 through 8	Screen, printed/LCD	Error injection: single error; error rate: user-selectable; printer port: serial; pattern select: all ones, QRSS, user-programmable; internal clock/calendar, AC/DC power, digital milliwatt	Tests DDS as a subchannel on a T-1 line, sends repeating pattern user-definable up to 8 bits, or digital milliwatt (1,000 Hz tone)	1 year/$4,495
Digital Link Corp. **Sunnyvale, Calif.** **(408) 745-6200**	DL551X	RJ-48, DB15	ESF, SF	D3/D4	AMI, B8ZS	1, 2, 5	1, 5, 7, 9 through 13, 15, 17, 18, 19	1, 2, 3, 4, 5, 8	Screen, printed, front-panel display/CRT	Printer port: serial; internal clock/calendar, AC/DC power	DTE loop-back, CSU self-test for DTE, net loop-back, digital loop-back for DDS	2 years/$2,880

OPERATING MODES KEY

1 = Transmit/receive
2 = Through/monitor
3 = Drop & insert
4 = Dual duplex drop & insert
5 = CSU loop up & down

MEASUREMENTS AND INDICATORS KEY

1 = Alarm indication signal
2 = All ones
3 = Average error rate
4 = Bit
5 = Bipolar pulse violations
6 = Clock
7 = Cyclic redundancy check 6
8 = Current error rate
9 = Errored seconds
10 = Excessive zeros
11 = Frame errors
12 = Frame slips
13 = Frame alarms
14 = Loop slips
15 = Percent error-free seconds
16 = Received clock frequency
17 = Remote alarms
18 = Severely errored seconds
19 = Total errors

STATUS REPORTS GENERATED KEY

1 = All ones
2 = B8ZS
3 = Excessive zeros
4 = Loss of signal
5 = Loss of frame
6 = Loss of pattern
7 = Synchronization
8 = Yellow signal

AC = Alternating current
AMI = Alternate mark inversion
B3ZS = Bipolar three zero substitution
B6ZS = Bipolar six zero substitution
B8ZS = Bipolar eight zero code substitution
CEPT = Conference Europeenne des Postes et Telecommunications
CSU = Channel service unit
DC = Direct current
DDS = Digital data service
DTE = Data terminal equipment
ESF = Extended superframe format
HDB3 = High density bipolar three
NA = Information not available
NID = Network Interface device
PRBS = Pseudo-random bit sequence
QRSS = Quasi-random signal source
QRW = Quasi-random word
SF = Superframe format

T-carrier and DDS test equipment

Vendor	Product	Connection	Frame format	Time slot sequence	Line coding	Operating modes	Measurements and indicators	Status reports generated	Status display/display type	Features	DDS/DTE testing	Warranty/price
Digital Transmission Systems, Inc. **Duluth, Ga.** **(404) 497-0101**	DTS 4010 ESF	64-pin Telco	ESF, SF	D4	AMI, B8ZS	1, 2, 5	1, 7, 9, 11, 13, 17, 18, 19	2, 4, 5, 8	Screen/CRT	Printer port: parallel, serial; Internal clock/calendar; power: -48 volts; high-density and low-density pattern select	Allows testing of DDS carrier lines and DTE	1 year/NA
Four C Enterprises, Inc. **Branford, Conn.** **(203) 481-5275**	MegaBERT Plus Test Facility	DB25	ESF, SF, unframed	Not applicable	AMI, B8ZS	1, 2, 4, 5	1 through 5, 8 through 13, 15, 17, 18, 19, statistics per CCITT G.821	1 through 8	Screen, printed/LCD	Error injection: single error; error rate: 10^{-3} to 10^{-7}; printer port: serial; pattern select: all ones, QRSS; internal clock calendar, AC/DC power	Allows testing of DDS carrier lines, performs selected pattern and pseudo-random pattern tests	2 years/$3,000
Hekimian Laboratories, Inc. **Gaithersburg, Md.** **(301) 590-3600**	3705 with Option .64 ESF PCM and Option .65 BER	Bantam jack and barrier strip	ESF, SF, SLC96	D1D, D2, D3/D4, SLC96, DCS test port	AMI, B8ZS	1 through 5	1 through 5, 7 through 11, 13, 15, 17, 18	1, 4 through 8	Screen, printed/vacuum flourescent	Error injection: single error; printer port: serial; pattern select: all ones, QRSS, user-programmable, 3:24, internal clock/calendar, AC or DC power	Allows testing of DDS carrier lines or DTE, includes 56K bit/sec Straight-away test (bit error rate)	1 year/$10,795 to $15,995
Hewlett-Packard Co. **Palo Alto, Calif.** **(415) 857-1501**	HP3787B	DB25, 310, bantam jack	ESF, SF, T1DM, SLC96	D1D, D2, D3/D4, SLC96	AMI, B8ZS	1, 2, 3, 5	1 through 13, 15, 18, 19, total CSES	1, 3 through 8	Screen, printed/CRT	Error injection: single error; printer port: parallel, serial; pattern select: all ones, QRSS, user-programmable; internal clock/calendar, AC/DC power (-48 volts station batteries)	Allows testing of DDS carrier lines or DTE, includes MJU signaling, secondary channel testing, subrate error correction, logic/near logic far test access, DDS testing from a DS1 access, comprehensive DDS loop-back (alternating/ latching), DDS return-code display	1 year/$8,750
Intelco Corp. **Acton, Mass.** **(508) 264-4485**	T1/DS1 ESF Printing BER Analyzer Model 620	RJ-48, 310, DB15, Adapters for bantam jack	SLC96, unframed	Not applicable	AMI, B8ZS	1, 2, 5	1 through 11, 13, 15, 16, 17, 18, elapsed test time, CSES bursts, performance analysis per CCITT G.821	1 through 8	Screen, printed/LCD	Error injection: single error; error rate: 1 X 10^{-3} to 5 X 10^{-9}; pattern select: all ones, QRSS, user-programmable, 3:24 programmable loop-back; internal clock/calendar, AC/DC power	None	1 year/$3,250
International Data Sciences, Inc. **Lincoln, R.I.** **(401) 333-6200**	76A	DB15	ESF, SF, unframed	D3/D4	AMI, B8ZS	1, 2, 5	3, 4, 5, 7, 9, 11, 13, 15, 17, 19	4, 6, 7, 8	Screen/LCD	Error injection: single error; pattern select: all ones, QRSS, 1:8, 1:24; AC power	None	3 years/$1,790
Larse Corp. **Santa Clara, Calif.** **(408) 988-6600**	TNDS-0100, 0200, 1400	RJ-48	ESF, SF (converts SF to ESF)	D1D	AMI, B8ZS (converts to/from AMI & B8ZS)	1, 2, 5	1, 2, 5, 7 through 11, 13, 15, 17, 19, failed seconds, times generating keep-alive, times receiving keep-alive, times receiving yellow signal, times declaring red alarm	1 through 8	RS-232 supervisory port for ASCII terminal	Error injection: single error; pattern select: all ones, QRSS, Q5, 1:8, 1:16; internal clock/calendar, AC/DC power	Performs DTE loop-back	2 years/$3,095 to $34,630
Metro-Tel Corp. **Hicksville, N.Y.** **(516) 937-3420**	DDI 100R-9 Drop & Insert	Bantam jack, 310	ESF,SF	D1D, D2, D3/D4	AMI, B8ZS	1 through 4	2, 5, 7, 9, 11, 13, 17	1, 2, 4, 5, 8	Not applicable/LED	-48 volts or AC power	None	1 year/$2,495
Network Communications Corp. **Eden Prairie, Minn.** **(612) 944-8559**	7100 Network Probe	DB25, RJ-48, RJ-4J, DB37, DB9, BNC, bantam jack	ESF, SF, CEPT	D1D, D2, D3/D4, SLC96, CEPT	AMI, B8ZS, HDB3, B7	1 through 5	1 through 19	1 through 8	Screen, printed/LCD	Error injection: single error; error rate: user selectable; printer port: serial; pattern select: all ones, QRSS, user-programmable; internal clock/calendar, AC/DC power	Allows testing of DDS carrier lines and DTE; includes every DDS-specific test that can be done on carrier lines	1 year parts and labor/$12,000

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5 = Bipolar pulse violations
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7 = Cyclic redundancy check 6
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9 = Errored seconds
10 = Excessive zeros
11 = Frame errors
12 = Frame slips
13 = Frame alarms
14 = Loop slips
15 = Percent error-free seconds
16 = Received clock frequency
17 = Remote alarms
18 = Severely errored seconds
19 = Total errors

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3 = Excessive zeros
4 = Loss of signal
5 = Loss of frame
6 = Loss of pattern
7 = Synchronization
8 = Yellow signal

AC = Alternating current
AMI = Alternate mark inversion
B7 = Bit 7
B8ZS = Bipolar eight zero code substitution
CEPT = Conference Europeenne des Postes et Telecommunications
CSES = Consecutive severely errored seconds
CSU = Channel service unit
DC = Direct current
DCS = Digital cross-connect system
DDS = Digital data service
DTE = Data terminal equipment
ESF = Extended superframe format
HDB3 = High density bipolar three
MJU = Multipoint junction unit
NA = Information not available
Q5 = Variation of quasi-random test pattern
QRSS = Quasi-random signal source
SF = Superframe format
T1DM = T-1 data multiplexer

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04. ☐ Real Estate
05. ☐ Healthcare Services
06. ☐ Legal
07. ☐ Hospitality
08. ☐ Retail/Wholesale Trade
09. ☐ Transportation
10. ☐ Utilities
11. ☐ Education
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14. ☐ Government Federal
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16. ☐ Aerospace
17. ☐ Consultants (independent)
18. ☐ Carriers
19. ☐ Interconnects
20. ☐ Manufacturers (Computer/Communications)
21. ☐ VAR/VAD/Systems House
22. ☐ Distributor, Computer Related
23. ☐ Distributor, Communications Related
24. ☐ Other ____________________

2. Job function (check one only)

1. ☐ Networking Management (Responsible for both voice & data)
2. ☐ Data Communications Management (Responsible for data only)
3. ☐ Telecommunications Management (Responsible for voice only)
4. ☐ MIS Management (VP,Dir,Department Head)
5. ☐ Corporate Management (Chairman, President, Owner, General Manager, CEO, CIO, VP)
6. ☐ Financial Management
7. ☐ Engineering Management
8. ☐ Consultant (Independent)
9. ☐ Other____________________

3. Your primary responsibility (check one only)

1. ☐ Data Networking
2. ☐ Voice Networking
3. ☐ Both
4. ☐ None

4. Is your network: (check all that apply)

LOCAL AREA NETWORKS
1. ☐ Local (within building)
2. ☐ Local (in a campus environment)

WIDE AREA NETWORKS
3. ☐ International
4. ☐ National
5. ☐ Regional (several states)
6. ☐ Metropolitan

5. Which transmission media do you use in your network: (check all that apply)

Public:
1. ☐ Switched-Based (DDD,Wats,Megacom,etc.)
2. ☐ Leased Line (not including T-1)
3. ☐ T-1
4. ☐ T-3
5. ☐ Digital Data Service

Private:
6. ☐ Satellite
7. ☐ Microwave
8. ☐ Fiber Optic

6. Which of the following vendors will you consider buying your PBX/Central Office Switch from in the next 12 months? (check all that apply)

	A PBX	B COS	
01.	☐	☐	AT&T
02.	☐	☐	ALCATEL
03.	☐	☐	CONTEL
04.	☐	☐	ERICSSON
05.	☐	☐	FUJITSU
06.	☐	☐	HARRIS
07.	☐	☐	HITACHI
08.	☐	☐	IBM/ROLM Systems Division
09.	☐	☐	INTECOM
10.	☐	☐	MEMOREX TELEX
11.	☐	☐	MITEL
12.	☐	☐	NEC
13.	☐	☐	NORTHERN TELECOM
14.	☐	☐	SIEMENS
15.	☐	☐	STROMBERG-CARLSON
16.	☐	☐	TOSHIBA
17.	☐	☐	OTHER

7. What operating systems do you utilize? (check all that apply)

1. ☐ CICS
2. ☐ IBM DOS
3. ☐ MVS
4. ☐ UNIX
5. ☐ VM
6. ☐ VMS
7. ☐ OTHER ____________

8. Please indicate by vendor the number of mainframes/minicomputers installed in your network.

VENDOR	MAIN-FRAMES A	MINIS B
01. DEC		
02. IBM		
03. AMDAHL		
04. AT&T		
05. HONEYWELL BULL		
06. NCR		
07. DATA GENERAL		
08. WANG		
09. HEWLETT PACKARD		
10. PRIME		
11. TANDEM		
12. UNISYS		
13. CONTROL DATA		
14. OTHER		

9. Please indicate by vendor the number of microcomputers:

A) Presently installed in your network.
B) The approximate quantity you plan to install in the next 12 months.

MICROCOMPUTER VENDOR/ WORKSTATION	PRESENTLY INSTALLED A	PLAN TO INSTALL NEXT 12 MONTHS B
01. COMPAQ		
02. PCs based on 80386 chip		
03. IBM (PC,XT,AT)		
04. IBM (PS/2)		
05. APPLE (Macintosh)		
06. AT&T		
07. SUN		
08. APOLLO		
09. LAPTOPS		
10. OTHER		

10. What is your host network architecture? (check all that apply)

1. ☐ SNA
2. ☐ DECNET
3. ☐ OSI
4. ☐ GOSIP
5. ☐ MAP/TOP
6. ☐ OTHER ____________

11. What is your LAN Operating System? (check all that apply)

01. ☐ 10NET
02. ☐ 3COM (3+, 3+open)
03. ☐ APPLETALK
04. ☐ BANYAN (VINES)
05. ☐ DCA (IRMALAN)
06. ☐ IBM (OS/2 EXTENDED EDITION)
07. ☐ IBM (PC Network)
08. ☐ MICROSOFT (LAN MANAGER)
09. ☐ NOVELL (NETWARE)
10. ☐ NOVELL (NETWARE MAC)
11. ☐ TOPS (TOPS)
12. ☐ OTHER ____________________

12. What is your LAN environment? (check all that apply)

1. ☐ Token Ring
2. ☐ ARCNET
3. ☐ Ethernet
4. ☐ Starlan
5. ☐ Other____________

NETWORK WORLD
The Newsweekly of User Networking Strategies

13. What is the scope of your involvement in purchase decisions for Network/Communications products + services? (check all that apply)

1. ☐ Organization-wide
2. ☐ Subsidiary/division wide
3. ☐ Department-wide
4. ☐ For multiple organizations (consultants)
5. ☐ Other ____________________

14. For which network hubs outside of the US do you have purchasing influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East

15. Write below the total number of sites for which you have purchase influence? ☐

16. Check ALL that apply in columns A and B

A) I am presently involved in the purchase process for the following products/services:
B) I plan to purchase the following products/service in the next 12 months:

	Presently Involved A	Plan to Purchase B	- COMPUTERS/PERIPHERALS: -
01.	☐	☐	Micros
02.	☐	☐	Minis
03.	☐	☐	Mainframes
04.	☐	☐	Front End Processors
06.	☐	☐	Terminals
07.	☐	☐	Printers
	A	B	- SOFTWARE: -
10.	☐	☐	Network Management
11.	☐	☐	Micro to Mainframe
12.	☐	☐	Network Security
13.	☐	☐	Call Accounting
14.	☐	☐	Data Base Management
15.	☐	☐	Systems Software
16.	☐	☐	Communications Software
17.	☐	☐	Applications Software
18.	☐	☐	Network Operating Systems Software
	A	B	- DATA COMMUNICATIONS -
20.	☐	☐	Modems (over 9.6kbps)
21.	☐	☐	Modems (under 9.6kbps)
22.	☐	☐	T-1 multiplexers
23.	☐	☐	Other Multiplexers
24.	☐	☐	Data Switches
25.	☐	☐	Matrix Switches
26.	☐	☐	Packet Switches
27.	☐	☐	Local Networks
28.	☐	☐	Protocol Converters
29.	☐	☐	Network Management Systems
30.	☐	☐	Terminal Emulation Boards
31.	☐	☐	Facsimile Machines
32.	☐	☐	Diagnostic Test Equipment
33.	☐	☐	Data Service Unit
	A	B	- TELECOMMUNICATIONS -
40.	☐	☐	PBXs (over 1000 lines)
41.	☐	☐	PBXs (200 - 1000 lines)
42.	☐	☐	PBXs (under 200 lines)
43.	☐	☐	Key Systems
44.	☐	☐	Automatic Call Distributors
45.	☐	☐	Voice Messaging Systems
46.	☐	☐	Channel Service
48.	☐	☐	Short Haul Bypass Equipment (Microwave, Infrared, etc.)
	A	B	- TRANSMISSION SERVICES -
50.	☐	☐	Switched Voice
51.	☐	☐	Dedicated Leased Line
52.	☐	☐	T-1
53.	☐	☐	T-3
54.	☐	☐	Digital Data
55.	☐	☐	Packet Switched
56.	☐	☐	Centrex
57.	☐	☐	Central Office LAN
58.	☐	☐	Satellite
59.	☐	☐	Fiber Optic
60.	☐	☐	On-Line Information
61.	☐	☐	Systems Integration
62.	☐	☐	Network Optimization
63.	☐	☐	Microwave
64.	☐	☐	Cables, Connectors, Baluns
65.	☐	☐	ISDN
66.	☐	☐	EMail

17. Estimated value of networking equipment and services:

A) Which you helped specify, recommend or approve in the last 12 months?
B) Which you plan to help specify, recommend or approve in the next 12 months?

	A	B	
01.	☐	☐	$25 million and over
02.	☐	☐	$20 - $24.9 mil
03.	☐	☐	$10 - $19.9 mil
04.	☐	☐	$5 - $9.9 mil
05.	☐	☐	$1 - $4.9 mil
06.	☐	☐	$500,000 - $999,999
07.	☐	☐	$250,000 - $499,999
08.	☐	☐	$100,000 - $249,999
09.	☐	☐	$50,000 - $99,999
10.	☐	☐	under $50,000

18. Estimated gross annual revenue of your entire company/institution: (check one only)

1. ☐ over $10 billion
2. ☐ $1 to $9.9 bill
3. ☐ $500 mil to $1 bill
4. ☐ $100 to $499.9 mill
5. ☐ $50 to $99.9 mill
6. ☐ $10 to $49.9 mill
7. ☐ $5 to 9.9 mill
8. ☐ under $5 mill

19. A) Estimated number of employees for your entire corporation: (check one in column A)

B) Estimated number of employees at this location: (check one in column B)

	A	B	
1.	☐	☐	over 10,000
2.	☐	☐	5,000 - 9,999
3.	☐	☐	2,500 - 4,999
4.	☐	☐	1,000 - 2,499
5.	☐	☐	500 - 999
6.	☐	☐	under 500

20. When do you plan to implement ISDN?

1. ☐ Currently testing
2. ☐ 12 - 24 months
3. ☐ 24 - 36 months
4. ☐ 36 + months
5. ☐ not implementing

950SNWW

T-carrier and DDS test equipment (continued on page 58)

Vendor	Product	Connection	Frame format	Time slot sequence	Line coding	Operating modes	Measurements and indicators	Status reports generated	Status display/display type	Features	DDS/DTE testing	Warranty/price
Network Control Corp. **Danbury, Conn.** **(203) 743-5354**	Janus "T" Manager	DB25, bantam jack, 310	ESF, SF	D1D, D2, D3/D4	AMI, B8ZS	1, 2, 3	1, 2, 5, through 13, 15, 17, 18, 19, 20, remote alarm reporting, remote configuration, bit error rate testing through protocol analyzer	1 through 8	Screen, printed/CRT, remote CRT, printer	Printer port: serial; internal clock/calendar; AC power; pattern select: remote alarm reporting and configuration	None	90 days/$2,500 per 2 T-1s
Phoenix Microsystems, Inc. **Huntsville, Ala.** **(205) 721-1200**	5500A Telecommunications and Data Analyzer	DB25, RJ-48, bantam jack	ESF, SF, unframed	D3/D4, SLC96	AMI, B8ZS	1, 2, 5	1 through 19	1, 3 through 8	Screen, printed/CRT	Error injection: single error; error rate: 9 X 10^{-2} to 1 X 10^{-9}; printer port: serial; pattern select: all ones, QRSS, user-programmable; internal clock/calendar; AC/DC power	Allows testing of DDS carrier lines and DTE, includes OCU loop-up, DSU loop-up, CSU loop-up, DSO-DP loop-back, latching loop-backs, sends 511, 2047, multiplexer unassigned code, idle, zero suppression	1 year/$6,995, DDS module for DTE: $2,495, DDS module for carrier side: $1,495
Scientific-Atlanta, Inc. **Atlanta, Ga.** **(404) 925-5067**	AT9500	310	ESF, SF	D3/D4, SLC96	AMI, B8ZS	1, 2, 5	1 through 11, 13, 15, 16, 18, 19, DES, BES, CSES	1 through 8	Screen, printed/LCD	Error injection: single error, printer port: parallel, serial; pattern select: all ones, QRSS, user-programmable, 3:24, 1:7, all zeros, 1010; AC/DC power; internal clock/calendar	Allows testing of DDS carrier lines or DTE, has a DS0 output	1 year/$9,400
Sierra, LSI Jennings **San Jose, Calif.** **(408) 292-4025**	460A Printing BERT	Various patch cords and adapter cables	ESF, SF, unframed	D1D, D2, D3/D4, SLC96	AMI, B8ZS	1, 2, 5	2 through 6, 8, 9, 10, 11, 13, 15 through 19	1 through 8	Screen, printed/LCD	Error injection: single error; pattern select: all ones, QRSS, user-programmable, 3:24; internal clock/calendar; AC/DC power	Allows testing of DDS carrier lines and DTE on a T-1 or DS-1 level only	3 years/$3,250
Tau-tron, Inc. **Westford, Mass.** **(800) 828-8766**	5108 DS1 Digital Transmission Test Set	DB25, RJ-48	ESF, SF	D3/D4, SLC96	AMI, B8ZS	1, 2, 5	1 through 19	1 through 8	Screen, printed/LED	Error injection: single error; error rate: 1 X 10^{-9} to 1 X 10^{-2}; printer port: serial, parallel; pattern select: all ones, QRSS, user-programmable; internal clock/calendar; AC/DC power	None	3 years parts and labor/$4,950
Tekelec **Calabasas, Calif.** **(800) 835-3732**	Chameleon 8000	310	ESF, SF, optional ZBTSI	D3/D4, SLC96	AMI, B8ZS	1 through 5, CSU emulation and network interface loop-up and -down	1 through 19, signaling status of all 24 channels, T-1 signal amplitude, transit time, data link processing, loop current, DS0, VF and pattern measurements, degraded minutes	1 through 8	Screen, printed/CRT	Error injection: single error; error rate: 10^{-2} to 10^{-9}; (code errors, logic errors, frame errors); printer port: parallel; pattern select: all ones, QRSS, user-programmable, 2047; internal clock/calendar; AC power	Allows testing of DDS carrier lines	1 year/$7,250
Tektronix, Inc. **LP Com Division** **Mountain View, Calif.** **(415) 967-5400**	TC2000-B1	Mini 310	ESF, SF	D1D, D2, D3/D4	AMI, B8ZS	1 through 5	1 through 19, user-programmable	1 through 8	Screen, printed/CRT	Error injection: single error; error rate: 3 X 10^{-3} to 10^{-8}; printer port: parallel; pattern select: all ones, QRSS, user-programmable; internal clock/calendar; AC power	Allows testing of DDS carrier lines, includes subrate testing	1 year/$12,500
Telecommunications Techniques Corp. **Germantown, Md.** **(301) 353-1550**	FIREBERD 6000	DB25, RJ-48, RS-232, bipolar bantam jack, 310	ESF, SF	D1D, D2, D3/D4, SLC96	AMI, B8ZS	1, 2, 5	3 through 19	2 through 8	Screen, printed/LED	Error injection: single error; error rate: 1 X 10^{-9} to 9 X 10^{-3}; printer port: serial; pattern select: all ones, QRSS, user-programmable, 1:1, 63, 511, 2047, 3:24, Fox; internal clock/calendar; AC power	Allows testing of DDS carrier lines and DTE, includes DS0A and DS0A compatibility, 19.2K bit/sec secondary channel, alternating and latching loop codes, multipoint junction unit controls, byte encoder, subrate multiplexer tests	3 years/$8,495

OPERATING MODES KEY

1 = Transmit/receive
2 = Through/monitor
3 = Drop & insert
4 = Dual duplex drop & insert
5 = CSU loop up & down

MEASUREMENTS AND INDICATORS KEY

1 = Alarm indication signal
2 = All ones
3 = Average error rate
4 = Bit
5 = Bipolar pulse violations
6 = Clock
7 = Cyclic redundancy check 6
8 = Current error rate
9 = Errored seconds
10 = Excessive zeros
11 = Frame errors
12 = Frame slips
13 = Frame alarms
14 = Loop slips
15 = Percent error-free seconds
16 = Received clock frequency
17 = Remote alarms
18 = Severely errored seconds
19 = Total errors

STATUS REPORTS GENERATED KEY

1 = All ones
2 = B8ZS
3 = Excessive zeros
4 = Loss of signal
5 = Loss of frame
6 = Loss of pattern
7 = Synchronization
8 = Yellow signal

AC = Alternating current
AMI = Alternate mark inversion
B8ZS = Bipolar eight zero code substitution
BES = Bursty errored seconds
CSES = Consecutive severely errored seconds
CSU = Channel service unit
DC = Direct current
DDS = Digital data service
DES = Dribbling errored seconds
DSO-DP = Data signal 0-data port

DSU = Data service unit
DTE = Data terminal equipment
ESF = Extended superframe format
NA = Information not available
OCU = Office channel unit
QRSS = Quasi-random signal source
SF = Superframe format
VF = Voice frequency
ZBTSI = Zero byte time slot interchange

NETWORK WORLD

T-carrier and DDS test equipment

Vendor	Product	Connection	Frame format	Time slot sequence	Line coding	Operating modes	Measurements and indicators	Status reports generated	Status display/display type	Features	DDS/DTE testing	Warranty/price
Test Systems Reliance Comm/Tec **Euless, Texas** **(817) 540-9700**	T-Analyst TP-205	DB9, 310, bantam jack	ESF, SF	D1D, D2, D3/D4, SLC96	AMI, B8ZS	1 through 5	1 through 11, 13, 15 through 19,	1 through 8, SLC96, protection line switch messages, maintenance field bits, current alarms	Screen, printed/LCD	Error injection: single error; error rate: 10^{-3} to 10^{-6}; printer port: serial; pattern select: QRSS, user-programmable, 3:24 internal clock/calendar; AC/DC power	None	1 year/$3,995
3M Dynatel Systems Division **Austin, Texas** **(800) 426-8688**	VenCAT F80	RS-232	ESF, SF	D1D, D2, D3/D4, SLC96	AMI, B8ZS	1 through 5	1, 2, 5, 6, 7, 10 through 14, 17	1 through 5, 7, 8	LCD/not applicable	Printer port: serial; AC/DC power	Allows testing of DDS carrier lines and DTE; breaks out one of the 24 DS0 circuits on a bipolar format, along with a composite clock for use with the DDS test set	1 year/$4,995
Verilink Corp. **San Jose, Calif.** **(408) 945-1199**	Verinet 2.2 Surveillance System	DB25, RJ-48	ESF, SF	D1D, D2, D3/D4	AMI, B8ZS	1, 2, 5	3 through 11, 13, 15, 17, 19	1, 3, 4, 5, 7	Screen, printed/CRT	Printer port: serial, pattern select: framed all ones; internal clock/calendar; AC/DC power	Allows testing of DTE only	2 years/$2,000 to $3,000
Wilcom Products, Inc. **Laconia, N.H.** **(603) 524-2622**	D400 Digital Test System	Bantam jack, 310	ESF, SF	D1D, D2, D3/D4, SLC96	AMI, B8ZS	1 through 5	1, 2, 3, 4 (optional), 5 through 9, 11 through 15, 17, 18, full analog channel measurements, level, frequency	1, 2, 4, 5, 6 (optional), 7, 8	Screen, printed/LCD, CRT via RS-232 port	Error injection: single error (optional); printer port: serial; pattern select: all ones, QRSS, user-programmable (optional); internal clock/calendar; AC power	Currently none; can generate CSU and DSU loop-back codes	2 years/$6,995

OPERATING MODES KEY

1 = Transmit/receive
2 = Through/monitor
3 = Drop & insert
4 = Dual duplex drop & insert
5 = CSU loop up & down

MEASUREMENTS AND INDICATORS KEY

1 = Alarm indication signal
2 = All ones
3 = Average error rate
4 = Bit
5 = Bipolar pulse violations
6 = Clock
7 = Cyclic redundancy check 6
8 = Current error rate
9 = Errored seconds
10 = Excessive zeros
11 = Frame errors
12 = Frame slips
13 = Frame alarms
14 = Loop slips
15 = Percent error-free seconds
16 = Received clock frequency
17 = Remote alarms
18 = Severely errored seconds
19 = Total errors

STATUS REPORTS GENERATED KEY

1 = All ones
2 = B8ZS
3 = Excessive zeros
4 = Loss of signal
5 = Loss of frame
6 = Loss of pattern
7 = Synchronization
8 = Yellow signal

AC = Alternating current
AMI = Alternate mark inversion
B8ZS = Bipolar eight zero code substitution
CSU = Channel service unit
DC = Direct current
DDS = Digital data service
DSU = Data service unit
DTE = Data terminal equipment
ESF = Extended superframe format
QRSS = Quasi-random signal source
SF = Superframe format

This chart includes a representative selection of vendors in the T-carrier and DDS test equipment market. Most vendors offer other products, and many vendors not included offer a full range of competitive products.

NETWORK WORLD CHART

(continued from page 54)

should be user-programmable — just a basic comparison with stored or industry-standard thresholds. I can't keep in my mind what the 20 or so parameters should be; I have better things to think about." He emphasizes that such a capability could dramatically reduce user training and analysis time.

"There should also be a sort of historical buffer, a way to store information taken in the field and returned to headquarters for analyzing," Evenchik adds. "More often than not, the person in the field is not the person who can analyze the information. Most large organizations concentrate their technical talent in the network control center, and that's not where the testing is done."

DDS testing

User testing for DDS carries at least one important distinction when compared to testing the T-carrier: the T-carrier is the information conduit, and DDS is a service within the conduit.

"A T-carrier tester, in more generic terms, is really testing a transport system," Stanley says. "DDS is a service. The T-carrier is a pipe: It is not, in and of itself, a service. DDS, because it is a service conveying information, requires a different type of testing.

"To some extent, T-carrier testing is a facility type of testing," he adds. "DDS is a subrate or channelized type. The T-carrier can work perfectly and not care what's inside of it; inside the T-carrier, the DDS can be totally down. But if the T-carrier goes down, the DDS system won't be up until the T-carrier is up."

> "A T-carrier tester, in more generic terms, is really testing a transport system," Stanley says. "DDS, because it is a service conveying information, requires a different type of testing."
>
> ▲▲▲

Most user testing of DDS-type services is protocol testing done within user customer premises equipment or with protocol test sets. Some end-to-end diagnostic capability is provided by test equipment vendors. DDS-specific testing equipment may become more popular with the introduction of secondary channel DDS.

The secondary channel, developed by AT&T, provides users with either a secondary data channel or the capability to perform end-to-end diagnostics without taking the DDS line out of service. The channel is provided through the use of a "time-sharing" scheme that allows the control bit in one of every three information bytes to carry user information.

This information can be user data or diagnostic information. Currently, no vendors have developed equipment specifically to take advantage of the secondary channel.

According to the experts, if you suspect DDS problems — usually as a result of packet errors on the network — you need to check the link and the network. Checking the link requires on-premises DDS testing equipment. Checking the network is done with standard protocol analyzers. Both concentrate on the end-user area of the network rather than on the end-to-end line testing more often done with T-carrier.

"The only thing users can really do with DDS or similar services is buy a [bit error rate testing] set that provides a V.35 or RS-232 interface and do a point-to-point test," TTC's Murray says. "If they have somebody at the far end who can provide a hard loop, then they could do a loop-back test, essentially. From that, you can get bit errors, bit error rates, error-free seconds and percentage of error-free seconds, which are essentially the measurements used to check and see if the carrier is meeting the tariffs for availability and quality."

It's also good to check the round-trip propagation delay, or transmission delay, This helps find protocol time-outs. Some bit error rate sets can provide this.

"There really isn't much DDS-specific equipment for the end user," Murray concludes.

The price factor

As with any purchase, you get what you pay for. Functionality is limited only by price: The more you spend, the more functions you should get.

"You've really got to decide what type of testing you want," Wilcom's Simpson says. "Think about how much you want to spend and what type of testing you'll be doing. See what the carrier is using. If you're both using the same types of equipment, and getting the same results, and running it the same way, it makes life a lot easier." ◼

Vendors face lean market for LAN Mgr.

By Susan Breidenbach
West Coast Bureau Chief

While LAN Manager users are still scarce, LAN Manager suppliers are not.

Other than 3Com Corp., six LAN Manager OEMs have shipped LAN Manager products since last October. Those companies are Cogent Data Technologies, Inc., Corvus Systems, Inc., Interlan, Inc., Standard Microsystems Corp., Torus Systems, Inc. and Ungermann-Bass, Inc. In addition, Digital Communications Associates, Inc. and NCR Corp. plan to ship LAN Manager by year end.

With so many vendors chasing a handful of early users, there seems to be some danger that LAN Manager OEMs will cannibalize one another and leave Novell, Inc.'s two-thirds market share largely untouched, analysts said.

The OEMs are avoiding conflict by targeting different niches in the market and adding value to their versions of LAN Manager.

Most LAN Manager suppliers are adding drivers to the network operating system for a particular network adapter. Corvus' niche is its installed base of Omninet/1 and Omninet/4 users, and the initial Corvus LAN Manager consists of the generic Microsoft product, plus drivers for Omninet/1 and Omninet/4 boards.

Standard Microsystems is distinguishing itself as the only Arcnet vendor offering LAN Manager. Unlike Corvus, Standard Microsystems is interested in selling Standard Microsystems LAN Manager along with Arcnet cards to new users, rather than migrating its existing customer base to a new network operating system.

"The bulk of our business is in small to medium-size businesses," said Lance Murrah, product manager. "We see these as new networks; we don't expect people to rip out Novell file servers and replace them with LAN Manager."

Torus Systems' niche is its installed base. Chuck Olson, a marketing manager at Torus, said the company's Tapestry II LAN Manager is being well-received by existing Tapestry users.

"The response is that the performance is terrific compared to the DOS-based, proprietary Tapestry product," Olson said. Tapestry's icon-based user interface has been ported to the new product, simplifying the migration process for users, he added.

Interlan is shipping the generic LAN Manager product along with diskettes containing International Standards Organization protocols — initially Network Basic I/O System and TP-4. Support for the Transmission Control Protocol/Internet Protocol will follow shortly. The protocol software runs in servers and workstations but can also be offloaded to intelligent network adapters.

The Interlan LAN Manager is also distinguished from other versions by its $2,195 price, which is by far the lowest (see chart, page 62).

Richard Henkus, an Interlan product manager, said his company has also written protocol software that supports Novell Inc.'s Integrated Packet Exchange transport protocol and operates with the LAN Manager Protocol Manager.

Ungermann-Bass sees opportunity in providing a NetWare-to-LAN Manager gateway solution and is shipping its Net/One LAN Manager.

"That sets us apart: We don't ignore NetWare's market share," said Jennifer Vessels, Net/One LAN Manager product marketing manager for Ungermann-Bass.

While the other LAN Manager OEMs are downplaying potential market conflicts, Cogent Data Technologies makes no bones about them, according to Deanna Anderson, Cogent Technologies' executive vice-president.

Anderson said Cogent took a page out of Novell's book and is supplying "a generic LAN Manager solution that supports lots of different network hardware."

Cogent does this by adding a high-speed NETBIOS protocol stack to LAN Manager with interfaces to Arcnet and Ethernet adapters. ▣

NACHA report supports merger

continued from page 4

tronically, all financial institutions that maintain corporate accounts will need to have this capability," the report said.

According to Nelson, if 500 to 1,000 of the country's largest banks upgrade their systems to support transmission of remittance statements, automated clearinghouse networks will be able to adequately process remittance information for 90% of the 10 billion annual corporate payments in the U.S.

Nelson added that banks will find themselves competing for business with EDI service providers, which currently transmit remittance information along with such things as purchase orders and invoices. "There's no doubt we're going to compete with [EDI service providers]," he said. "We'll see who wins out."

Banks have one advantage in that only depository institutions can move money between bank accounts. EDI service providers cannot enter this business.

According to the "EDI Position Paper," sending payments and remittance information together over bank networks has several advantages over other approaches (see graphic).

EDI meets EFT

Five options for delivering payments and remittance statements

Payment	Remittance data
Mail check.	Attach paper documents to check.
Mail check.	Transmit via EDI network.
Transmit via national clearinghouse network.	Transmit via EDI network.
Send over private bank network.	Transmit via private bank network. (Supplier's bank must be linked to private network.)
Send via national clearinghouse network.	Transmit via national clearinghouse network. Supplier's bank forwards to supplier.

SOURCE: NATIONAL AUTOMATED CLEARINGHOUSE ASSOCIATION, HERNDON, VA
EFT = Electronic funds transfer
GRAPHIC BY SUSAN J. CHAMPENY

Sending checks and remittance documents through the mail costs 40 cents to $1.50 more per payment than transmitting these items electronically, the report said, mostly because of added data-entry costs.

Other approaches, in which the payment is either mailed or transmitted electronically, separate the check from the remittance, thus increasing the likelihood that payments will arrive without proper documentation. In addition, the report concluded that EDI service providers charge from 10 cents to $2 more per remittance than bank electronic funds transfer service providers do.

Building a private network linking selected banks and suppliers causes problems since the number of banks and suppliers that can participate is limited. As an example, the paper cites General Motors Corp., which it says has set up a private network with six banks.

According to Nelson, this has created a situation in which only 30% of GM's suppliers can receive payments and remittances electronically. GM makes 80% of its purchases from these suppliers, he said. ▣

Federal Reserve preps for future, plans EFT network overhaul

WASHINGTON, D.C. — The Federal Reserve System is planning a major overhaul of its electronic funds transfer network in anticipation of a potential explosion in electronic funds transfer transactions over the next few years.

Federal Reserve data centers last year processed about 80% of the 1.14 billion electronic funds transfers sent through the country's 42 automated clearinghouse networks. Currently, the Federal Reserve receives batch transfers of funds transfer orders from banks over dial-up or dedicated links. It routes payments to receiving banks twice daily.

Last month, the Federal Reserve, based here, signed a multimillion-dollar contract with IBM to build a new prototype electronic funds transfer system, said Jack Guynn, chief operating officer of the Federal Reserve Bank of Atlanta and electronic funds transfer product director for the Federal Reserve.

The prototypical IBM system uses IBM System/88 fault-tolerant computers running custom-designed software that continuously processes the electronic transactions.

According to Guynn, the Federal Reserve is also experimenting with mainframe-based software that supports continuous transaction processing. The Federal Reserve will decide by the middle of next year which approach to adopt, he said.

Guynn said the Federal Reserve is readying its network to handle escalating transaction volume. The volume of electronic funds transfer transactions has been increasing by about 30% annually for the past few years.

— *Barton Crockett*

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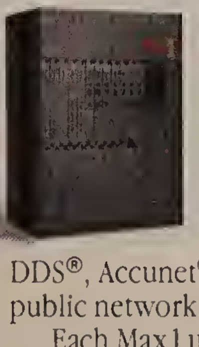

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HP bolsters workstation line

continued from page 2

on a single problem, and optimized use of processors, because spare CPU cycles are put to work.

Although few NCS-compatible applications are available today, more than 100 companies have licensed NCS, including heavyweights IBM and Digital Equipment Corp. ("Apollo NCS lacks software but still draws followers," *NW*, April 3).

"NCS is a little bundle of technology that HP thought was worth the money," Rogers said. "But what really motivated HP was the opportunity to double its market share for not a lot of money."

"The combined market share of Hewlett-Packard and Apollo in the technical workstation market is in the 28% to 29% range, compared with Sun Microsystems, Inc.'s 28% to 30% market share," said Lawrence Harris, securities analyst for Bateman Eichler, Hill Richards, Inc. in Los Angeles.

HP will overtake DEC, another major workstation vendor, as a result of the deal, Harris said. "Under the old order of things, the market was ranked Sun, DEC, HP, Apollo," he said. "Now, HP is in a virtual tie with Sun."

Apollo, based in Chelmsford, Mass., pioneered computer workstations in 1980 with the introduction of high-powered single-user devices designed for computer-aided design and software engineering applications. Many of the founding members of the company were from Prime Computer, Inc., a minicomputer maker based in nearby Natick, Mass.

If the deal — a tender of $13.125 per share in cash for 36.3 million shares of Apollo's common stock — goes through, HP plans to integrate Apollo as a separate division into its Workstation Group.

HP will use the Apollo name for products invented by Apollo, but Tolliver said he did not know how long that would continue. HP will maintain the Apollo facility in Chelmsford and retain Apollo's corporate officers, but Tolliver declined to say whether there would be any layoffs.

Users weigh role of standards

continued from page 8

import distribution at the Somerville, N.J., office of Hoechst Celanese Corp., said his company will not move to EDIFACT until its parent company in West Germany adopts it.

"They still haven't begun using EDIFACT," Morpurgo said. "That probably means we won't be using it for at least a couple years."

Some U.S. users could find themselves pressured to use EDIFACT by domestic trading partners, said Thomas Cebular, EDI client service representative at LTV Steel Co. in Cleveland.

Cebular said his company has yet to move toward EDIFACT because the group in charge of formulating the international standard is aligning it more closely with existing European EDI standards than with the ANSI X12 standards.

"We've put too much work into developing X12 to just throw it away," Cebular said.

William Sherwood, project leader for the Manufacturing & Material Systems group at Chrysler Motors Corp. in Center Line, Mich., said his company also has been frustrated by a lack of cooperation on the part of the United Nations-sponsored group in working out differences between EDIFACT and X12.

"We don't expect to be using EDIFACT anytime soon," said Sherwood, whose company has more than 2,000 EDI trading partners. "We're doing just fine using X12 with our international partners now."

While most users at the EDI conference have yet to implement EDIFACT, the show attracted a number of domestic EDIFACT pioneers and dedicated a number of sessions to international EDI.

Brian Nicolson, assistant European EDI systems manager for Texas Instruments Ltd. in Bedford, England, discussed TI's EDIFACT pilot tests at one session. The company is currently conducting EDIFACT transactions with a number of its European trading partners, including IBM, he said.

"Any company that has a lot of overseas trading partners has no choice but to go with EDIFACT," Nicolson said. "I know I probably said this last year, but this is going to be the year for EDIFACT."

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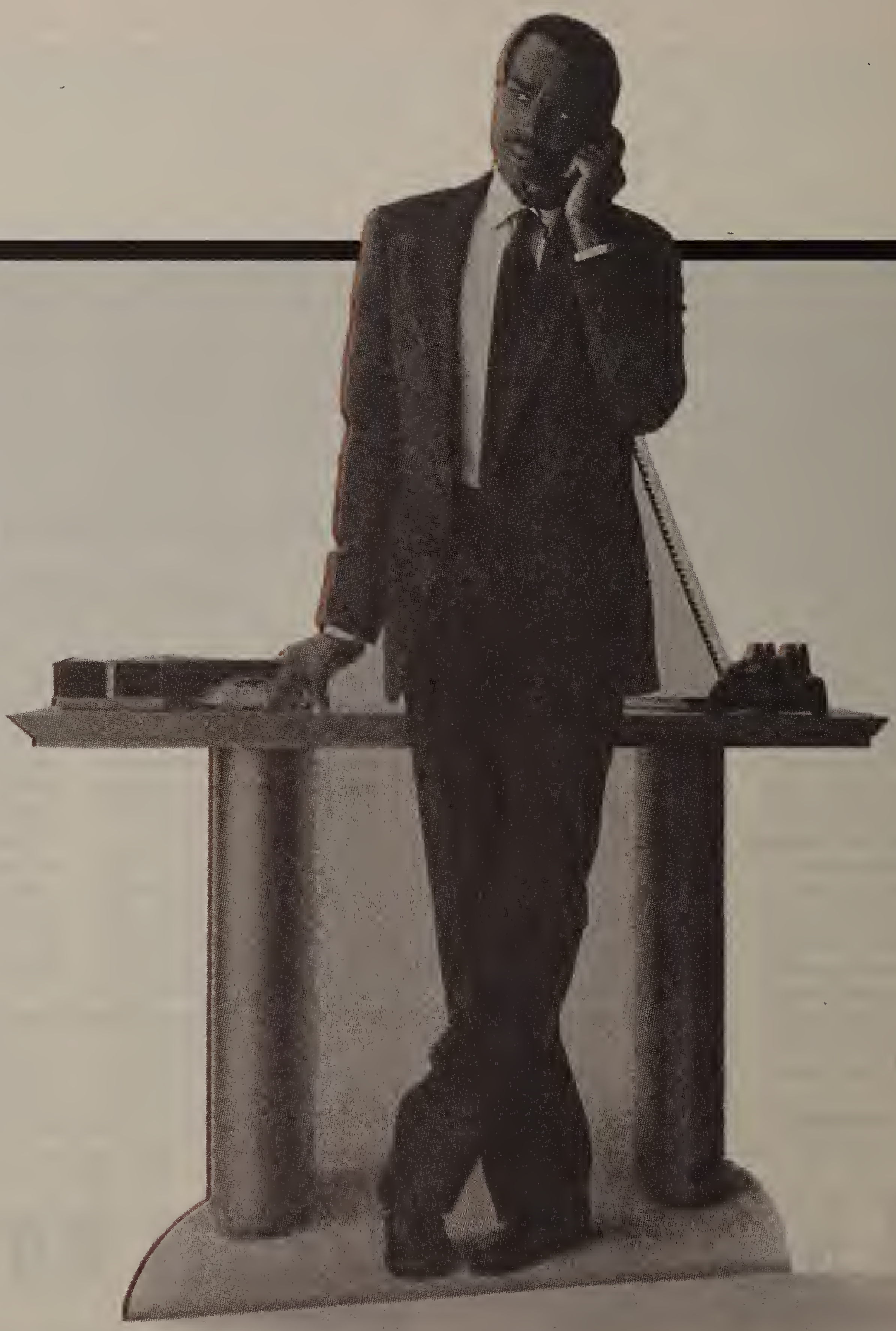

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Covia leverages Apollo net

continued from page 23

in nine cities to the main computer center in Denver.

The system supports a scripting function that can be used with Microsoft Corp.'s Microsoft Windows on travel agent workstations in the network, Mercurio said. "On one window, the computer can be talking to another local computer; and on another, it can be talking to a mainframe system thousands of miles away," he said.

Hotels can use the scripting function to improve sales and marketing, according to Mercurio. For instance, if a hotel is offering a special weekend rate that requires guests to stay overnight on Friday, a manager could create a customized sales script for reservation agents. That script could feature a pop-up screen that reminds the agent to tell the guest about the special rate, he said.

Covia Reserve is part of a general trend toward personalizing reservation systems to fit specific market segments, said Mark Winther, vice-president of electronic communications services for Link Resources Corp., a market research firm in New York.

"Hotels have different requirements [in taking reservations] than do car rental firms, airlines or vacation resorts," Winther said. "To remain competitive, it's a lot cheaper for a small hotel to subscribe to a third party's reservation system rather than build its own."

But not everyone praises Covia Reserve. "Covia Reserve isn't a competitive system yet," said Larry Chervenak, president of Chervenak, Keane & Co., a hotel technology consulting company in New York. "It's more promise than performance at this time. They don't have the features and functions for the hotel operations."

Chervenak said that competition from J.C. Penney Co.'s hotel reservation system and AMR Corp.'s Confirm network may have prompted the development of Covia Reserve.

"Apollo is a great airline reservation network, and we wish Covia well," Chervenak said. "But I've seen too many of these competition-engendered announcements made before [the technology is] ready." ☑

Telecom book of limited value

continued from page 23

consulting firm Pacific Netcom, Inc., is the author of three other communications-related books, including an earlier volume entitled *The Dow Jones-Irwin Handbook of Telecommunications.*

The warning about prior knowledge proves unnecessary. Since Green goes into such depth explaining the components of various types of equipment, such as private branch exchanges, the reader doesn't need any previous knowledge. In many chapters, Green's obsession with detail obstructs his basic message about management.

Green's selection of topics also seems a bit strange. The author manages to avoid discussing in any detail most of the newer technologies, such as voice mail, very small aperture terminal satellites and teleconferencing, that experienced managers want to learn about.

Even with tried-and-true technologies, Green's topic selection seems a bit off the mark. For instance, he presents a superb discussion of network security but scarcely mentions disaster recovery. He spends an inordinate amount of time on outbound switched services but ignores inbound 800 services. He presents a comprehensive view of traditional, terrestrial-based data networks but doesn't mention anything about satellite networks.

Green's experience as a consultant strengthens the book. He writes clearly and confidently about time-honored methodologies for financial analysis and system comparison. He provides clear and illuminating passages on how to perform feasibility studies and life-cycle analyses.

Of particular value are his chapters on requests for proposal. He also offers excellent chapters on negotiating contracts and managing consultants.

Despite these strong points, experienced communications managers will not learn a great deal from this book. Managers with little experience, however, will probably find the *Handbook* a useful primer on a select range of subjects. ☑

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Hospital utilizes HL-7 in project

continued from page 2

on a local net, likely to be provided by Ungermann-Bass, Inc. In a year's time, when the HL-7 specifications are fully developed, Simborg will provide Scottsdale with software that translates STAT LAN protocols to HL-7.

Scottsdale Memorial's current information system includes a "hodgepodge of stand-alone systems having poor or no ability to communicate with one another," said Stan Prorock, manager of the corporate information network. Each hospital has a central minicomputer that processes departmental applications, but the hospitals have to exchange data by physically carrying disks between sites.

The new net will enable users at both hospitals to access data running on any application in the net. The lone stipulation is that all networked systems be HL-7-compatible. "That's our only commandment," Walker said.

A tall order

Last May, when Walker and his information systems staff presented their open network plans to upper management, obeying that commandment was a tall order. At the time, few consultants had heard of HL-7 and few vendors were committed to developing products based on the multilayered protocol, Walker said.

To reduce the risk of using Simborg, a start-up vendor, and a nascent protocol standard, Walker and his staff decided to incorporate a "core" system in the open network configuration. The core would consist of a minicomputer that would support six of the hospital's most widely used applications, including admission, discharge and transfer as well as accounts payable and maintenance of medical records.

The core would be a convenient fallback if "HL-7 crashed or Simborg turned out to be a sham," Walker said.

The recent groundswell of support for HL-7 and open systems has given Walker confidence that the hospital's decision was the right one. Ten other hospitals have since installed Simborg's Stat LAN HL-7.

More than 140 vendors and consultants now belong to the HL-7 group that is propelling the HL-7 specifications. A year ago, less than half that number belonged to the group. ◼

LAN Mgr. gets mixed grades

continued from page 1

cial net operating system based on LAN Manager — 3+Open LAN Manager — in October, but it is keeping a tight lid on sales figures.

"I think the numbers are below Microsoft's initial expectations, but I don't think you can read a lot into them at this point," said Mary McCaffery, a securities analyst who follows the local net market for C.J. Lawrence, Grenfell, Morgan, Inc. in New York. "It's still very early in the game."

Microsoft and its LAN Manager OEMs may not have courted many users yet, but suppliers of the network operating system have been readily shipping LAN Manager products since last fall (see "Vendors face lean market for LAN Mgr.," page 59).

While Microsoft and 3Com say they have converted some Novell NetWare users to LAN Manager, the early adopters seem to be organizations or work groups composed of first-time local net users who believe OS/2 is the wave of the future.

The sewer utility and sewage treatment plant for the city of Tacoma, Wash., decided to put in its first local net about a year ago, and it entertained bids from Novell, Ungermann-Bass, Inc. and Digital Communications Associates, Inc.'s 10NET Communications division before settling on 3Com's 3+Open LAN Manager.

The decision to go with LAN Manager was based on "a gut feeling that OS/2 was going to replace DOS as a server operating system," said Adrienne Barbon, project manager in charge of the network undertaking.

OS/2 LAN Manager versions available in U.S.

Company	Product	Ship date	Price
3Com Corp. Santa Clara, Calif.	3+Open LAN Manager	October 1988	$2,995 ($995 for 5-user version)
Torus Systems, Inc. Redwood City, Calif.	Tapestry II LAN Manager	November 1988	$2,995
Ungermann-Bass, Inc. Santa Clara, Calif.	Net/One LAN Manager	January 1989	$2,995 ($995 for 5-user version)
Cogent Data Technologies, Inc. Friday Harbor, Wash.	Cogent LAN Manager 286	January 1989	$2,495
Interlan, Inc. Boxborough, Mass.	Interlan LAN Manager	March 1989	$2,195 ($995 for 5-user version)
Standard Microsystems Corp. Hauppauge, N.Y.	SMC LAN Manager	March 1989	$2,795 ($995 for 5-user version)
Corvus Systems, Inc. San Jose, Calif.	Corvus LAN Manager	April 1989	$2,750

GRAPHIC BY SUSAN J. CHAMPENEY

Although the Tacoma plant has yet to install its network, Habersham Group, a collection of companies in Atlanta that includes Habersham Federal Savings Bank, installed two small 3+Open networks three months ago to link 16 workstations.

"The savings bank had a large number of 8088-based machines and wanted to continue to use them," said Harold Biggio, director of research and development for the group. "LAN Manager offered the capability to move a lot of what is in OS/2 down to the [DOS] workstation level."

Biggio decided to go with LAN Manager because of the SQL Server product. Habersham runs a transaction-processing application on a mainframe and periodically downloads transaction summaries to an SQL Server data base. The summaries can then be accessed instantly. Getting the same information from the mainframe can take up to an hour, Biggio said.

"The combination of OS/2, LAN Manager and SQL Server gives you, in our estimation, something close to mainframe capability at the file server level," Biggio added. "It's like a whole new world: You get all the advantages of the mainframe with the easy access of the PC environment."

The only complaint Biggio has about the initial release of 3+Open is the amount of memory its Ethernet drivers use in the workstations. When the drivers, the LAN Manager shell (the workstation component) and DOS are loaded, there is not enough room for certain applications, he said.

Two departments in TRW, Inc.'s Information Services Group in Orange, Calif., opted for 3+Open at about the same time Habersham Group did last summer. Ed Snitz, a TRW systems analyst in charge of the network acquisition, said he was not satisfied at the time with the answers Novell and Banyan Systems, Inc. had provided concerning their plans to support OS/2.

"We're not currently running OS/2 on the workstations, but we're looking to the future," Snitz said. "We see Presentation Manager [OS/2's graphical user interface] as something we don't want to be locked out of."

Like Biggio, Snitz found that the size of the 3+Open workstation shell prevented his people from running certain applications.

Another unexpected shortcoming was the inability of DOS workstations to send messages across the network, Snitz said. 3+Open's built-in messaging system lets OS/2 machines send and receive messages, while it only lets DOS machines receive them.

However, he said there have been no complaints from users about performance, and he praised the product's ease of installation.

"The problems we've encountered so far tend to be due more to pilot error than to any bugs in the software," he said. ◼

NET adds tools for IDNX nets

Network Equipment Technologies, Inc. (NET) rolled out new net management tools and connectivity options for accessing Integrated Digital Network Exchange (IDNX) backbones. They include:

- The Series 5000 Network Management System, which is based on a Sun Microsystems, Inc. workstation under Unix. The Series 5000 can be attached to a Transmission Control Protocol/Internet Protocol-based local network with up to four other net management workstations. This allows multiple net operators to run different net management programs at the same time.
- The PacketPlus/50, which is an X.25 packet switch with as many as 16 ports, each supporting a maximum speed of 64K bit/sec. The switch has a peak throughput of 2,000 packet/sec and is priced from $1,423 to $2,696 per line. It will be available in May.
- The LanExchange/50, a router provided by cisco Systems, Inc., can be used to transport local network traffic over an IDNX backbone. The router provides bridging for IEEE 802.3 Ethernet-type and IEEE 802.5 token-ring local networks and concurrently supports Digital Equipment Corp. DECnet and TCP/IP as well as other protocols. Pricing starts at $16,000. It will be available in June.
- Finally, NET announced SPX/Software Interface for DEC VAX systems under VMS, software that enables asynchronous terminals to access, over an IDNX backbone, applications residing on VAXes attached to an Ethernet. It is priced from $1,295 to $3,995 and is scheduled to be available in July.

— *John Cox*

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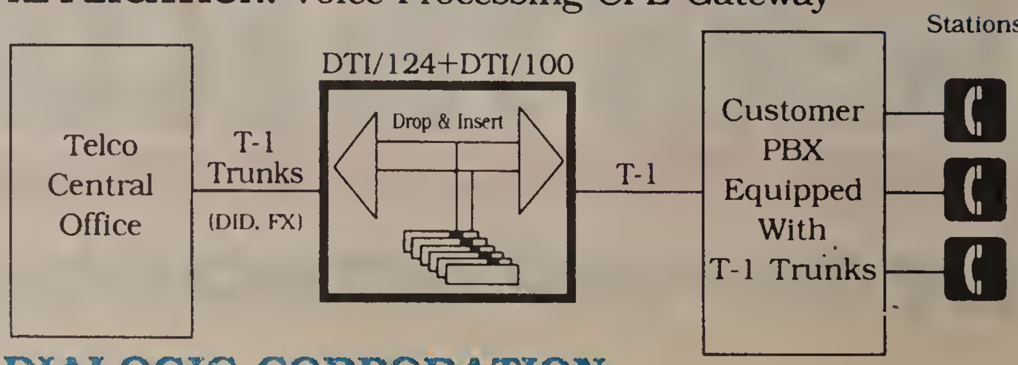

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NET unveils T-3 mux in product blitz

continued from page 1

within the telephone industry. The two companies will develop a nonblocking digital cross-connect system with 64 T-3 ports for private networks.

The device will support the Synchronous Optical Network transmission standard and is intended to form a gateway between private and public networks.

The high end

The new IDNX/90 T-3 multiplexer, which is compatible with the rest of the company's product line, provides 256M bit/sec of nonblocking switching capacity. It supports up to four T-3 interfaces, all of which can be redundant, or a mix of T-3 and T-1 interfaces. The multiplexer has a total of 16 interface slots and supports all the features of the other IDNX models.

NET officials said the IDNX/90 is the first non-subrated T-3 multiplexer. Competing devices divide the 45M bit/sec bandwidth of a T-3 into 28 subrate 1.544M bit/sec T-1 channels, said Gordon Heinrich, product manager for the IDNX/90.

NET's Bruce Smith

With subrate T-3 multiplexers, applications can use only the bandwidth within an individual channel, whereas NET's device pools the total bandwidth and divides it into whatever capacities are needed, he said.

The IDNX/90 will not be available until the first quarter of 1990. Users with IDNX/70 T-1 multiplexers will be able to upgrade to the bigger box, but NET officials declined to provide details or prices on such an upgrade. The company also refused to release pricing information for the new multiplexer.

At least one analyst gave the new device high marks. "The IDNX/90 represents a simple yet elegant way to address the requirements of T-3 transmission facilities," said Tim Zerbiec, vice-president of technology at Vertical Systems Group, a Dedham, Mass., consulting firm.

Zerbiec said the IDNX/90 uses the same network control architecture of the previous IDNX models while expanding the maximum bandwidth capacity of the IDNX/70 from 32M to 256M bit/sec.

Entry level

The new low-end IDNX/10 supports one active and one redundant T-1 link, enabling users to link smaller sites into T-1 backbones. Each T-1 can support up to 23 DS0 voice ports — the 24th is reserved for the IDNX common signaling protocol — or 30 data ports.

The IDNX/10 supports an array of analog and digital interfaces for voice connections, and synchronous data at speeds up to 56K bit/sec via RS-232-C or 64K bit/sec via V.35 or RS-422. The multiplexer can be managed from any of the NET management products.

The IDNX/10 supports fractional T-1 services as well as 64K bit/sec DS0 channels bundled together and leased as alternatives to full T-1 pipes. Fractional T-1 is cost-effective for users that need four to 12 DS0s at a single site, Zerbiec said.

"It's like T-1, but you pay as you go," said Mark Juliano, NET's product marketing manager for the IDNX/10.

The new network management services include Expert Fault Management Service (EFMS) and Expert T-Span service.

They are the first of what will be a family of services offered by NET's service organization, which operates a number of Technical Assistance Centers. The centers are staffed by technical troubleshooters who are on call to diagnose network problems and coordinate service.

EFMS is provided using NET-developed expert system software on a Sun Microsystems, Inc. Unix workstation that resides at either the customer site or the Technical Assistance Center and is linked to a customer's IDNX node ("NET readies expert net control," *NW,* Jan 23).

The workstation continuously monitors the IDNX net, collecting an array of diagnostic data. When problems arise, the system uses a knowledge base and a set of rules to identify the likely cause. It then recommends possible responses, alerts technicians at the Technical Assistance Center or the customer site and creates a trouble ticket to begin tracking the problem.

With the Expert T-Span service, the Technical Assistance Center staff will take over the responsibility of solving all problems associated with carrier-supplied T-1 facilities.

Pricing and availability

NET said EFMS, which includes Expert T-Span, would cost about $25,000 a year for a three- to five-node IDNX network. EFMS will be available in June.

The Expert T-span service, available now, costs $180 monthly for nets with intelligent channel service units (CSU) and $148 for those with other CSUs. ◘

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